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Attorney Docket No. SO-3170

First Inventor or Application Identifier Bunch et al.

Title Biomarkers and Assays for Carcinogenesis

Express Mail Label No. EJ482621614US

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APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

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| - Reference to Microfiche Appendix | |
| - Background of the Invention | |
| - Brief Summary of the Invention | |
| - Brief Description of the Drawings (if filed) | |
| - Detailed Description | |
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| - Abstract of the Disclosure | |
| 3. <input checked="" type="checkbox"/> Drawing(s) (35 U.S.C. 113) [Total Sheets 1] | 7. <input type="checkbox"/> Assignment Papers (cover sheet & document(s)) |
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Bunch et al.

Filed: 01/25/00

For: BIOMARKERS AND ASSAYS FOR CARCINOGENESIS

Assistant Commissioner for Patents
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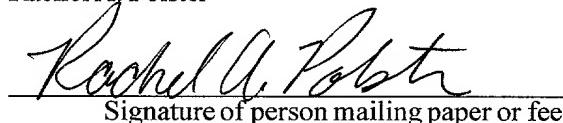
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BIOMARKERS AND ASSAYS FOR CARCINOGENESIS

This application is a continuation-in-part of US provisional application Serial No. 60/118,078, filed on January 29, 1999, the contents of which are hereby incorporated herein.

Field of the Invention

The present invention relates to genes differentially regulated by phenobarbital, nucleic acid molecules or fragments thereof that act as biomarkers for carcinogenesis, and nucleic acid molecules that are useful as probes or primers for detecting or inducing carcinogenesis, respectively. The invention also relates to applications such as forming antibodies capable of binding carcinogenesis biomarkers or fragments thereof.

Background

In the field of toxicology, high resolution assays now make it possible to discover differences in gene expression brought on by exposure to a particular xenobiotic. Such high-throughput, high-resolution molecular biology methods can be used to determine virtually all toxicant-induced changes in gene expression. A catalog of toxicant-induced gene expression changes would be useful to better predict animal toxicity in order to reduce costs, timelines, and animal use by enhancing the probability that product candidates chosen for further development will pass regulatory testing requirements. Such a catalog would also enable scientists to better predict human toxicity, resulting in fewer compounds failing in clinical trials while better safeguarding human health.

The basis for these types of investigations is the expectation that toxicological endpoints (e.g. tumor formation) are the result of earlier molecular events. For example, by creating a catalog of changes in rat liver gene expression following treatment with phenobarbital, one can test whether early gene expression

is as predictive as later readouts in assessing the nongenotoxic carcinogenicity of this compound in rats.

The power of transcriptional genomic analyses is that they can measure changes in the expression of thousands of genes, and a comprehensive catalog of expression changes can be envisioned. Using the same catalog of changes, other known nongenotoxic carcinogens (NGCs) could be assessed, as well as compounds known not to be NGCs in rats. Analysis of correlations between the changes and carcinogenesis, as well as analysis of the biological significance of the genes, should indicate whether there are specific genes or gene-expression patterns that predict carcinogenesis. Thus, there is a need in the art for catalogs or panels of predictive markers. Such panels of expressed genes would allow one to examine a greater number of candidate compounds in a shorter period of time prior to selecting a lead compound for traditional testing. As a result of this screening approach, the success rate of compounds in pre-clinical trials should improve dramatically.

These panels of predictive markers could also be used to assess the use of primary rat hepatocytes in high-throughput cell-based assays of toxicity and carcinogenicity. This would further increase the number of compounds that could be assessed, perhaps to the point where entire compound libraries could be assayed, and scores for potential toxicities could be created for each compound. Further, parallel analyses using both animal and human genes could be used to correlate the results from pre-clinical in vivo and in vitro data (using both cultured animal and cultured human cells) with human clinical data to create assays that better predict human toxicity.

Summary Of The Invention

It is an object of the present invention to provide a catalog or panel of changes in gene expression that are predictive of carcinogenicity. The catalog

includes substantially-purified nucleic acid sequences that have been discovered. In one embodiment, the present invention relates to a substantially-purified nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ NO: 1 through SEQ NO: 580 or fragments, substantial homologues, and substantial complements thereof.

In another embodiment, the present invention relates to a substantially-purified carcinogenesis biomarker or fragment thereof encoded by a first nucleic acid molecule which substantially hybridizes to a second nucleic acid molecule, the second nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ NO:1 through SEQ NO:580 and complements thereof.

It is another object of the present invention to provide an assay for toxicity to predict the carcinogenicity of a composition. In a further embodiment, the present invention relates to a method for measuring the carcinogenicity of a composition comprising exposing a mammal to the composition; and determining the presence or absence of mRNA which substantially hybridizes to a nucleic acid sequence selected from the group consisting of SEQ NO:1 through SEQ NO:580 and complements thereof.

It is a further object of the present invention to provide a quantitative and qualitative method of detection of carcinogenesis-related proteins or peptides of the present invention. In one embodiment, antibodies, proteins, peptides, or fusion proteins that specifically bind to one or more of the proteins encoded by the nucleic acid molecules of the present invention can be used to measure the carcinogenesis-related proteins.

Various other objects and advantages of the present invention will become apparent from the following figures and description of the invention.

Brief Description of the Drawings

Figure 1 shows a comparison of mRNA levels of differentially expressed transcripts.

Detailed Description Of The Invention

A. General Concepts and Definitions

These detailed descriptions are presented for illustrative purposes only and are not intended as a restriction on the scope of the invention. Rather, they are merely some of the embodiments that one skilled in the art would understand from the entire contents of this disclosure. All parts are by weight and temperatures are in Degrees centigrade unless otherwise indicated.

Abbreviations and Definitions

The following is a list of abbreviations and the corresponding meanings as used interchangeably herein:

IMDM = Iscove's modified Dulbecco's media

mg = milligram

ml or mL = milliliter

μ g or ug= microgram

μ l or ul = microliter

ODNs= oligonucleotides

PCR= polymerase chain reaction

RP-HPLC = reverse phase high performance liquid chromatography

The following is a list definitions of various terms used herein:

The term "**altered**" means that expression differs from the expression response of cells or tissues not exhibiting the phenotype.

The term "**amino acid(s)**" means all naturally occurring L-amino acids.

The term “**biologically active**” means activity with respect to either a structural or a catalytic attribute, which includes the capacity of a nucleic acid to hybridize to another nucleic acid molecule, or the ability of a protein to be bound by an antibody (or to compete with another molecule for such binding), among others. Catalytic attributes involve the capacity of the agent to mediate a chemical reaction or response.

The term “**cluster**” means that BLAST scores from pairwise sequence comparisons of the member clones are similar enough to be considered identical with experimental error.

The term “**complement**” means that one nucleic acid exhibits complete complementarity with another nucleic acid.

The term “**complementarity**” means that two molecules can hybridize to one another with sufficient stability to permit them to remain annealed to one another under conventional high stringency conditions.

The term “**complete complementarity**” means that every nucleotide of one molecule is complementary to a nucleotide of another molecule.

The term “**degenerate**” means that two nucleic acid molecules encode for the same amino acid sequences but comprise different nucleotide sequences (see US Patent 4,757,006).

The term “**exogenous genetic material**” means any genetic material, whether naturally occurring or otherwise, from any source that is capable of being inserted into any organism.

The term “**expression response**” means the mutation affecting the level or pattern of the expression encoded in part or whole by one or more nucleic acid molecules.

The term “**fragment**” means a nucleic acid molecule whose sequence is shorter than the target or identified nucleic acid molecule and having the identical, the

substantial complement, or the substantial homologue of at least 7 contiguous nucleotides of the target or identified nucleic acid molecule.

The term "**fusion protein**" means a protein or fragment thereof that comprises one or more additional peptide regions not derived from that protein. Such molecules may be derivatized to contain carbohydrate or other moieties (such as keyhole limpet hemocyanin, etc.).

The term "**hybridization probe**" means any nucleic acid capable of being labeled and forming a double-stranded structure with another nucleic acid over a region large enough for the double stranded structure to be detected.

The term "**isolated**" means an agent is separated from another specific component with which it occurred. For example, the isolate material may be purified to essential homogeneity, as determined by PAGE or column chromatography, such as HPLC. An isolated nucleic acid can comprise at least about 50, 80, or 90% (on a molar basis) of all macromolecular species present. Some of these methods described later lead to degrees of purification appropriate to identify single bands in electrophoresis gels. However, this degree of purification is not required.

The term "**marker nucleic acid**" means a nucleic acid molecule that is utilized to determine an attribute or feature (*e.g.*, presence or absence, location, correlation, etc.) of a molecule, cell, or tissue.

The term "**mimetic**" refers to a compound having similar functional and/or structural properties to another known compound or a particular fragment of that known compound.

The term "**minimum complementarity**" means that two molecules can hybridize to one another with sufficient stability to permit them to remain annealed to one another under at least conventional low stringency conditions.

The term "**PCR probe**" means a nucleic acid capable of initiating a polymerase activity while in a double-stranded structure with another nucleic acid. For

example, Krzesicki, *et al.*, *Am. J. Respir. Cell Mol. Biol.* 16:693-701 (1997), incorporated by reference in its entirety, discusses the preparation of PCR probes for use in identifying nucleic acids of osteoarthritis tissue. Other methods for determining the structure of PCR probes and PCR techniques have been described. The term "**phenotype**" means any of one or more characteristics of an organism, tissue, or cell.

The term "**polymorphism**" means a variation or difference in the sequence of the gene or its flanking regions that arises in some of the members of a species.

The term "**primer**" means a single-stranded oligonucleotide which acts as a point of initiation of template-directed DNA synthesis under appropriate conditions (e.g., in the presence of four different nucleoside triphosphates and an agent for polymerization, such as, DNA or RNA polymerase or reverse transcriptase) in an appropriate buffer and at a suitable temperature. The appropriate length of a primer depends on the intended use of the primer, but typically ranges from 15 to 30 nucleotides. Short primer molecules generally require cooler temperatures to form sufficiently stable hybrid complexes with the template. A primer need not reflect the exact sequence of the template, but must be sufficiently complementary to hybridize with a template.

The term "**probe**" means an agent that is utilized to determine an attribute or feature (e.g. presence or absence, location, correlation, etc.) of a molecule, cell, tissue, or organism.

The term "**product score**" refers to a formula which indicates the strength of a BLAST match using the fraction of overlap of two sequences and the percent identity. The formula is as follows:

$$\text{Product Score} = \frac{\text{BLAST Score} \times \text{Percent Identity}}{5 \times \min\{\text{length(Seq1)}, \text{length(Seq2)}\}}$$

The term “**promoter region**” means a region of a nucleic acid that is capable, when located in *cis* to a nucleic acid sequence that encodes for a protein or peptide, of functioning in a way that directs expression of one or more mRNA molecules.

The term “**protein fragment**” means a peptide or polypeptide molecule whose amino acid sequence comprises a subset of the amino acid sequence of that protein.

The term “**protein molecule/peptide molecule**” means any molecule that comprises five or more amino acids.

The term “**recombinant**” means any agent (e.g., DNA, peptide, etc.), that is, or results from, however indirectly, human manipulation of a nucleic acid molecule.

The recombination may occur inside a cell or in a tube.

The term “**selectable marker**” means a gene who’s expression can be detected by a probe as a means of identifying or selecting for transformed cells.

The term “**specifically bind**” means that the binding of an antibody or peptide is not competitively inhibited by the presence of non-related molecules.

The term “**specifically hybridizing**” means that two nucleic acid molecules are capable of forming an anti-parallel, double-stranded nucleic acid structure.

The term “**substantial complement**” means that a nucleic acid sequence shares at least 80% sequence identity with the complement.

The term “**substantial fragment**” means a fragment which comprises at least 100 nucleotides.

The term “**substantial homologue**” means that a nucleic acid molecule shares at least 80% sequence identity with another.

The term “**substantial identity**” means that 70% to about 99% of a region or fragment in a molecule is identical to a region of a different molecule. When the individual units (e.g., nucleotides or amino acids) of the two molecules are schematically positioned to exhibit the highest number of units in the same position over a specific region, a percentage identity of the units identical over the total

number of units in the region is determined. Numerous algorithmic and computerized means for determining a percentage identity are known in the art. These means may allow for gaps in the region being considered in order to produce the highest percentage identity.

The term "**substantially hybridizes**" means that two nucleic acid molecules can form an anti-parallel, double-stranded nucleic acid structure under conditions (e.g. salt and temperature) that permit hybridization of sequences that exhibit 90% sequence identity or greater with each other and exhibit this identity for at least a contiguous 50 nucleotides of the nucleic acid molecules.

The term "**substantially purified**" means that one or more molecules that are or may be present in a naturally occurring preparation containing the target molecule will have been removed or reduced in concentration.

Agents of the Invention

A. Nucleic Acid Molecules

The present invention relates to nucleic acid sequences selected from the group consisting of SEQ NO:1 through SEQ NO: 580, substantial fragments thereof, substantial homologues thereof, and substantial complements thereof. By creating a catalog of changes in rat liver gene expression following treatment with phenobarbital, substantially-purified nucleic acid sequences selected from the group consisting of SEQ NO: 1 through SEQ NO: 580 have been discovered. These sequences are useful as biomarkers of carcinogenesis.

The present invention also relates to nucleic acid sequences derived from the one or more sequences identified in SEQ NOS:1-580. Fragment nucleic acids may encompass significant portion(s) of, or indeed most of, these sequences. For example, a fragment nucleic acid can encompass an carcinogenesis biomarker gene homolog or fragment thereof. Alternatively, the fragments may comprise smaller

oligonucleotides, for example an oligonucleotide having from about 10 to about 250 nucleotides or from about 15 to about 30 nucleotide.

A variety of computerized means for identifying sequences derived from the SEQ NO.: 1-580 exists. These include the five implementations of BLAST, three designed for nucleotide sequences queries (BLASTN, BLASTX, and TBLASTX) and two designed for protein sequence queries (BLASTP and TBLASTN), as well as FASTA and others (Coulson, *Trends in Biotechnology* 12:76-80 (1994); Birren *et al.*, *Genome Analysis* 1:543-559 (1997)). Other programs which use either individual sequences or make models from related sequences to further identify sequences derived from SEQ NO 1- SEQ NO 580 exist. Model building and searching programs includes HMMer (Eddy), MEME (Bailey and Elkan, *Ismb* 3: 21-29 (1995)) and PSI-BLAST (Altschul *et al.*, *Nucleic Acids Res* 25: 3389-3402 (1997)). Another set of programs which use predicted, related, or known protein structures to further identify sequences derived from SEQ NO 1- SEQ NO 580 exists. Structure-based searching programs includes ORF and PROSITE. Other programs which use individual sequences or related groups of sequences relying on pattern discovery to further identify sequences derived from SEQ NO:1-580 exist. Pattern recognition programs include Teiresias (Rigoutsos, I. and A. Floratos, *Bioinformatics* 1: (1998)). These programs can search any appropriate database, such as GenBank, dbEST, EMBL, SwissProt, PIR, and GENES. Furthermore, computerized means for designing modifications in protein structure are also known in the art (Dahiyat and Mayo, *Science* 278:82-87 (1997)).

Nucleic acids or fragments thereof of the present invention are capable of specifically hybridizing to other nucleic acids under certain circumstances. The present invention further relates to nucleic acid sequences that will specifically hybridize to one or more of the nucleic acids set forth in SEQ NO: 1 through SEQ NO: 580, or complements thereof, under moderately stringent conditions, for

example at about 2.0 X SSC and about 65°C. Alternatively, the nucleic acid sequences of the present invention may specifically hybridize to one or more of the nucleic acids set forth in SEQ NO:1 through SEQ NO: 580, or complements thereof, under high stringency conditions.

The present invention also relates to nucleic acid sequences that share between 100% and 90% sequence identity with one or more of the nucleic acid sequences set forth in SEQ NO: 1 through to SEQ NO: 580 or complements thereof. In a further aspect of the invention, nucleic acid sequences of the invention share between 100% and 95% sequence identity with one or more of the nucleic acid sequences set forth in SEQ NO: 1 through SEQ NO: 580, or complements thereof. Alternatively, nucleic acid sequences of the present invention may share between 100% and 98% or between 100% and 99% sequence identity with one or more of the nucleic acid sequences set forth in SEQ NO: 1 through SEQ NO: 580, or complements thereof.

A region or fragment in a molecule with “substantial identity” to a region of a different molecule can be represented by a ratio. In a preferred embodiment, a 10 nucleotide in length nucleic acid region or fragment of the invention has a percentage identity of about 70% to about 99% with a nucleic acid sequence existing within one of SEQ NO.: 1-580 or a complement of SEQ NO.: 1-580.

The invention also provides a computer-readable medium having recorded thereon the sequence information of one or more of SEQ NO:1 through SEQ NO:580, or complements thereof. In addition, the invention provides a method of identifying a nucleic acid comprising providing a computer-readable medium of the invention and comparing nucleotide sequence information using computerized means.

i. Nucleic Acid Primers and Probes

The present invention also relates to nucleic acid primers and probes derived from the nucleic acid sequences set forth in SEQ NO: 1 through SEQ NO: 580. The nucleic acid primers and probes of the invention may be derived from the disclosed sequences, such as a fragment of 10 nucleotides or more or a sequence with 70% to 99% identity to a fragment of at least 10 nucleotides. Numerous methods for defining or identifying primers and probes for nucleic acid or sequence based analysis exist. Examples of suitable primers include, but are not limited to, the nucleic acid sequences set forth in SEQ NO: 519 through SEQ NO: 580. Examples of 5' primers (from the 5' to 3' direction) include, but are not limited to, SEQ NO: 550-580. Examples of 3' primers (from the 5' to 3' direction) include, but are not limited to, SEQ NO: 519-549. Examples of suitable probes include, but are not limited to, the nucleic acid sequences set forth in SEQ NO: 490 through SEQ NO: 518. The genes that corresponds to the primer and probe sequences (SEQ NO: 490-580) are described in Table 7.

Conventional stringency conditions are described by Sambrook, *et al.*, *Molecular Cloning, A Laboratory Manual*, 2nd Ed., Cold Spring Harbor Press, Cold Spring Harbor, New York (1989), and by Haymes, *et al. Nucleic Acid Hybridization, A Practical Approach*, IRL Press, Washington, DC (1985), the entirety of both is herein incorporated by reference. Departures from complete complementarity are therefore permissible, as long as such departures do not completely preclude the capacity of the molecules to form a double-stranded structure. Thus, in order for a nucleic acid molecule to serve as a primer or probe it need only be sufficiently complementary in sequence to be able to form a stable double-stranded structure under the particular solvent and salt concentrations employed.

Appropriate stringency conditions that promote DNA hybridization, for example, 6.0 X sodium chloride/sodium citrate (SSC) at about 45°C, followed by a wash of 2.0 X SSC at 50°C, are known to those skilled in the art or can be found in Ausubel, *et al.*, *Current Protocols in Molecular Biology*, John Wiley & Sons, N.Y. (1989) (see especially sections 6.3.1-6.3.6). [This reference and the supplements through January 2000 are specifically incorporated herein by reference and can be relied to make or use any embodiment of the invention.] For example, the salt concentration in the wash step can be selected from a low stringency of about 2.0 X SSC at 50°C to a high stringency of about 0.2 X SSC at 50°C. In addition, the temperature in the wash step can be increased from low stringency conditions at room temperature, about 22°C, to high stringency conditions at about 65°C. Temperature and salt conditions may be varied independently.

Primers and probes of the present invention can be used in hybridization assays or techniques, in a variety of PCR-type methods, or in computer-based searches of databases containing biological information. Exemplary methods include a method of identifying a nucleic acid which comprises the hybridization of a probe of the invention with a sample containing nucleic acid and the detection of stable hybrid nucleic acid molecules. Also included are methods of identifying a nucleic acid comprising contacting a PCR probe of the invention with a sample containing nucleic acid and producing multiple copies of a nucleic acid that hybridizes, or is at least minimally complementary, to the PCR probe.

The primers and probes of the invention may be labeled with reagents that facilitate detection (e.g., fluorescent labels, Prober et al., Science 238: 336-340 (1987), Albarella et al., EP 144914; chemical labels, Sheldon et al., U.S. Patent 4,582,789, Albarella et al., U.S. Patent 4,563,417; and modified bases, Miyoshi et al., EP 119448) all of which are incorporated by reference in their entirety)).

ii. Nucleic Acids Comprising Genes, Fragments, or Homologs Thereof

This invention also provides genes corresponding to the cDNA sequences disclosed herein, also called carcinogenesis biomarkers. The corresponding genes can be isolated in accordance with known methods using the sequence information disclosed herein. The methods include the preparation of probes or primers from the disclosed sequence information for identification and/or amplification of genes in appropriate genomic libraries or other sources of genomic materials.

In another preferred embodiment, nucleic acid molecules having SEQ NO: 1 through SEQ NO: 580, or complements and fragments of either, can be utilized to obtain homologues equivalent to the naturally existing homologues.

In a further aspect of the present invention, one or more of the nucleic acid molecules of the present invention differ in nucleic acid sequence from those encoding a homologue or fragment thereof in SEQ NO: 1 through SEQ NO: 580, or complements thereof, due to the degeneracy in the genetic code in that they encode the same protein but differ in nucleic acid sequence. In another further aspect of the present invention, one or more of the nucleic acid molecules of the present invention differ in nucleic acid sequence from those encoding an homologue or fragment thereof in SEQ NO: 1 through SEQ NO:580, or complements thereof, due to fact that the different nucleic acid sequence encodes a protein having one or more conservative amino acid residue. Examples of conservative substitutions are set forth below. Codons capable of coding for such conservative substitutions are well known in the art.

<u>Original Residue</u>	<u>Conservative Substitutions</u>
Ala	ser
Arg	lys
Asn	gln; his
Asp	glu
Cys	ser; ala
Gln	asn
Glu	asp
Gly	pro
His	asn; gln
Ile	leu; val
Leu	ile; val
Lys	arg; gln; glu
Met	leu; ile
Phe	met; leu; tyr
Ser	thr
Thr	ser
Trp	tyr
Tyr	trp; phe
Val	ile; leu

Genomic sequences can be screened for the presence of protein homologues utilizing one or a number of different search algorithms have that been developed, such as the suite of BLAST programs. The BLASTX program allows the comparison of nucleic acid sequences in this invention to protein databases.

In a preferred embodiment of the present invention, the homologue protein or fragment thereof exhibits a BLASTX probability score of less than 1E-30,

alternatively a BLASTX probability score of between about 1E-30 and about 1E-12 or a BLASTX probability score of greater than 1E-12 with a nucleic acid or gene of this invention. In another preferred embodiment of the present invention, the nucleic acid molecule encoding the gene homologue or fragment thereof exhibits a % identity with its homologue of between about 25% and about 40%, or alternatively between about 40% and about 70%, or from 70% and about 90%, or from about 90% and 99%. In another embodiment, the gene homologue or fragment has a single nucleotide difference from its homologue.

The resulting product score of a BLAST program ranges from 0 to 100, with 100 indicating 100% identity over the entire length of the shorter of the two sequences, and 0 representing no shared identity between the sequences. The homologue protein or fragment thereof may also exhibit a product score of 100. Alternatively, the product score is between about 49 and about 99. The protein or fragment may also exhibit a product score of 0. Alternatively, the homolog or fragment exhibits a product score between about 1 and about 49.

The sequences of the present invention were searched for sequence similarity and given biological annotations based on that similarity.

Table 1: Sequences down-regulated at least 1.7-fold by 13 weeks of treatment with phenobarbitol are shown with their corresponding annotation.

Table 2: Sequences up-regulated at least 1.7-fold by 13 weeks of treatment with phenobarbitol are shown with their corresponding annotation.

Table 3: Sequences down-regulated at least 1.7-fold by 5 weeks of treatment with phenobarbitol are shown with their corresponding annotation.

Table 4: Sequences upregulated at least 1.7-fold by 5 weeks of treatment with phenobarbitol are shown with their corresponding annotation.

iv. Vectors and Host Cells Containing Nucleic Acid Molecules

The present invention also relates to recombinant DNA molecules comprising a nucleic acid sequence of the invention and a vector. The invention further relates to host cells (mammalian and insect) that containing the recombinant DNA molecules. Methods for obtaining such recombinant mammalian host cell, comprising introducing exogenous genetic material into a mammalian host cell are also provided by the invention. The present invention also relates to an insect cell comprising a mammalian cell containing a mammalian recombinant vector. The present invention also relates to methods for obtaining a recombinant mammalian host cell, comprising introducing into a mammalian cell exogenous genetic material.

A recombinant protein may be produced by operably linking a regulatory control sequence to a nucleic acid of the present invention and putting it into an expression vector. Regulatory sequences include promoters, enhancers, and other expression control elements which are described in Goeddel (*Heme Expression Technology: Methods in Enzymology* 185. Academic Press, San Diego, CA (1990)). For example, the native regulatory sequences or regulatory sequences native to the transformed host cell can be used. One of skill in the art is familiar with numerous examples of these additional functional sequences, as well as other functional sequences, that may optionally be included in an expression vector. The design of the expression vector may depend on such factors as the choice of the host cell to be transformed, and/or the type of protein desired. Many such vectors are commercially available, including linear or enclosed elements (see for example, Broach, et al., *Experimental Manipulation of Gene Expression*, ed. M. Inouye, Academic Press, (1983); Sambrook, et al., *Molecular Cloning, A Laboratory Manual*, 2nd Ed., Cold Spring Harbor Press, Cold Spring Harbor, New York (1989)). Typically, expression constructs will contain one or more selectable

markers, including the gene that encodes dihydrofolate reductase and the genes that confer resistance to neomycin, tetracycline, ampicillin, chloramphenicol, kanamycin and streptomycin resistance.

Prokaryotic and eukaryotic host cells transfected by the described vectors are also provided by this invention. For instance, cells which can be transfected with the vectors of the present invention include, but are not limited to, bacterial cells such as *E. coli* (e.g., *E. coli* K 12 strains), *Streptomyces*, *Pseudomonas*, *Serratia marcescens* and *Salmonella typhimurium*, insect cells (baculovirus), including *Drosophila*, fungal cells, such as yeast cells, plant cells, and ovary cells (CHO), and COS cells.

One may use different promoter sequences, enhancer sequences, or other sequences which will allow for enhanced levels of expression in the expression host. Thus, one may combine an enhancer from one source, a promoter region from another source, a 5'- noncoding region upstream from the initiation methionine from the same or different source as the other sequences, and the like. One may provide for an intron in the non-coding region with appropriate splice sites or for an alternative 3'- untranslated sequence or polyadenylation site. Depending upon the particular purpose of the modification, any of these sequences may be introduced, as desired.

Where selection is intended, the sequence to be integrated will have an associated marker gene, which allows for selection. The marker gene may conveniently be downstream from the target gene and may include resistance to a cytotoxic agent, e.g. antibiotics, heavy metals, resistance or susceptibility to HAT, gancyclovir, etc., complementation to an auxotrophic host, particularly by using an auxotrophic yeast as the host for the subject manipulations, or the like. The marker gene may also be on a separate DNA molecule, particularly with primary mammalian cells. Alternatively, one may screen the various transformants, due to

the high efficiency of recombination in yeast, by using hybridization analysis, PCR, sequencing, or the like.

For homologous recombination, constructs can be prepared where the amplifiable gene will be flanked, normally on both sides, with DNA homologous with the DNA of the target region. Depending upon the nature of the integrating DNA and the purpose of the integration, the homologous DNA will generally be within 100 kb, usually 50 kb, preferably about 25 kb, of the transcribed region of the target gene, more preferably within 2 kb of the target gene. Where modeling of the gene is intended, homology will usually be present proximal to the site of the mutation. The term gene is intended to encompass the coding region and those sequences required for transcription of a mature mRNA. The homologous DNA may include the 5'-upstream region outside of the transcriptional regulatory region, or comprise any enhancer sequences, transcriptional initiation sequences, adjacent sequences, or the like. The homologous region may include a portion of the coding region, where the coding region may be comprised only of an open reading frame or combination of exons and introns. The homologous region may comprise all or a portion of an intron, where all or a portion of one or more exons may also be present. Alternatively, the homologous region may comprise the 3'-region, so as to comprise all or a portion of the transcriptional termination region, or the region 3' of this position. The homologous regions may extend over all or a portion of the target gene or be outside the target gene comprising all or a portion of the transcriptional regulatory regions and/or the structural gene.

Thus, the nucleic acid molecules described can be used to produce a recombinant form of the protein via microbial or eukaryotic cellular processes. Ligating the polynucleic acid molecule into a gene construct, such as an expression vector, and transforming or transfecting into hosts, either eukaryotic (yeast, avian, insect, plant, or mammalian) or prokaryotic (bacterial cells), are standard

procedures used in producing other well known proteins. Similar procedures, or modifications thereof, can be employed to prepare recombinant proteins according to the present invention by microbial means or tissue-culture technology.

Accordingly, the invention pertains to the production of encoded proteins or polypeptides by recombinant technologies.

B. Proteins and Polypeptides

The present invention also relates to proteins, peptides and polypeptides encoded by the nucleic acid sequences of the invention. Protein and peptide molecules can be identified using known protein or peptide molecules as a target sequence or target motif in the BLAST programs of the present invention. These proteins, peptides and polypeptides of the invention can be made using the nucleic acids or derived from the sequence information of the nucleic acids are also disclosed in the present invention. This invention also provides a compound or composition comprising one or more polypeptides, which comprise: 1) at least one fragment, segment, or domain of at least 15-1,000 contiguous amino acids, with at least one portion encoded by one or more of SEQ NOS: 1-580; 2) at least one amino acid sequence selected from those encoding at least one of SEQ NOS: 1-580; or 3) at least one modification corresponding to fragments, segments, or domains within one of SEQ NOS: 1- 580. The proteins, peptides and polypeptides of the invention can be made recombinantly as described above. Alternatively, the proteins, peptides and polypeptides of the invention can be produced synthetically.

Protein fragments or fusion proteins may be derivatized to contain carbohydrate or other moieties (such as keyhole limpet hemocyanin, etc.). A fusion protein or peptide molecule of the present invention is preferably produced via recombinant means.

Modifications can be naturally provided or deliberately engineered into the nucleic acids, proteins, and polypeptides of the invention to generate variants. For example, modifications in the peptide or DNA sequences can be made by those skilled in the art using known techniques, such as site-directed mutagenesis.

Modifications of interest in the protein sequences may include the alteration, substitution, replacement, insertion or deletion of one or more selected amino acid residues. For example, one or more cysteine residues may be deleted or replaced with another amino acid to alter the conformation of the molecule. Additional cysteine residues can also be added as a substitute at sites to promote disulfide bonding and increase stability. Techniques for identifying the sites for alteration, substitution, replacement, insertion or deletion are well known to those skilled in the art. Techniques for making alterations, substitutions, replacements, insertions or deletions (see, e.g., U.S. Pat. No. 4,518,584) are also well known in the art. Preferably, any modification of a protein, polypeptide, or nucleic acid of the invention will retain at least one of the structural or functional attributes of the molecule.

The polypeptide or protein can also be tagged to facilitate purification, such as with histidine- or methionine-rich regions [His-Tag; available from LifeTechnologies Inc, Gaithersburg, MD] that bind to metal ion affinity chromatography columns, or with an epitope that binds to a specific antibody [Flag, available from Kodak, New Haven, CT].

A number of purification methods or means are also known and can be used. For example, reverse-phase high performance liquid chromatography (RP-HPLC).

C. Antibodies

This invention also provides an antibody, polyclonal or monoclonal, that specifically binds at least one epitope found in or specific to a carcinogenesis

biomarker protein or polypeptide or a protein or polypeptide, of fragment or variant thereof, of this invention. Antibodies can be generated by recombinant, synthetic, or hybridoma technologies. One aspect of the present invention concerns antibodies, single-chain antigen binding molecules, or other proteins that specifically bind to one or more of the protein or peptide molecules of the present invention and their homologues, fusions or fragments. Such antibodies may be used to quantitatively or qualitatively detect the protein or peptide molecules of the present invention.

Nucleic acid molecules that encode all or part of the protein of the present invention can be expressed, by recombinant means, to yield protein or peptides that can in turn be used to elicit antibodies that are capable of binding the expressed protein or peptide. Such antibodies may be used in immunoassays for that protein or peptide. Such protein-encoding molecules or their fragments may be a “fusion” molecule (*i.e.*, a part of a larger nucleic acid molecule) such that, upon expression, a fusion protein is produced. It is understood that any of the nucleic acid molecules of the present invention may be expressed, by recombinant means, to yield proteins or peptides encoded by these nucleic acid molecules.

The antibodies that specifically bind proteins and protein fragments of the present invention may be polyclonal or monoclonal, and may comprise intact immunoglobulins, or antigen binding portions of immunoglobulins (such as (F(ab')₁), F(ab')₂ fragments), or single-chain immunoglobulins producible, for example, via recombinant means. Conditions and procedures for the construction, manipulation and isolation of antibodies (see, for example, Harlow and Lane, *Antibodies: A Laboratory Manual*, Cold Spring Harbor Press, Cold Spring Harbor, New York (1988), the entirety of which is herein incorporated by reference) are well known in the art.

As discussed below, such antibody molecules or their fragments may be used for diagnostic purposes. Where the antibodies are intended for diagnostic purposes, it may be desirable to derivatize them, for example with a ligand group (such as biotin) or a detectable marker group (such as a fluorescent group, a radioisotope or an enzyme).

The ability to produce antibodies that bind the protein or peptide molecules of the present invention permits the identification of mimetic compounds of those molecules. Combinatorial chemistry techniques, for example, can be used to produce libraries of peptides (see WO 9700267), polyketides (see WO 960968), peptide analogues (see WO 9635781, WO 9635122, and WO 9640732), oligonucleotides for use as mimetic compounds derived from this invention. Mimetic compounds and libraries can also be generated through recombinant DNA-derived techniques. For example, phage display libraries (see WO 9709436), DNA shuffling (see US Patent 5,811,238) other directed or random mutagenesis techniques can produce libraries of expressed mimetic compounds. It is understood that any of the agents of the present invention can be substantially purified and/or be biologically active and/or recombinant.

Uses of the Invention

The present invention also provides methods for identifying carcinogen compounds. The nucleic acids, peptides and proteins of the invention can be useful in predicting the toxicity of test compounds. Nucleic acids represent biomarkers which are correlated to an altered cellular state. These markers, individually or in combination, can be measured in response to compounds to screen for those compounds that suppress or activate the genes and thus alter the state of the cell in an undesired manner. Specifically, the nucleic acids, peptides and proteins can be used directly in numerous methods well known in the art to identify or detect the presence of specific nucleic acid or amino acid sequences.

Carcinogens can be identified by contacting an animal, tissue from a mammal, or a mammalian cell, such as a rat hepatocyte, with a compound, under conditions allowing production of mRNA by the cell. The resulting mRNA is then separated and its presence or absence detected. Differential expression of these biomarkers can be monitored in tissues and fluids at the mRNA level using methods well known in the art such as Northern hybridizations, RNAase protection, NMR, rt-PCR, and *in situ* hybridizations. *In vitro* techniques can also be used to detect differential expression of genomic DNA such as, for example, Southern hybridizations.

Similarly, differential expression of these biomarkers can be monitored at the protein level using, for example, enzyme linked immunosorbent assays (ELISAs), Western blots, HPLC-liquid chromatography, NMR, immunoprecipitations and immunofluorescence. Protein identification can also be performed using new techniques including biomolecular interaction analysis (BIA) and matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF). (Nelson *et al.*, Interfacing biomolecular interaction analysis with mass spectrometry and the use of bioreactive mass spectrometer probe tips in protein characterization, in Techniques in Protein Chemistry VIII, p. 493-504, 1997; Karlsson *et al.*, Experimental design for kinetic analysis of protein-protein interactions with surface plasmon resonance biosensors, J. Immun. Meth, 220, 121-133, 1997; Krone *et al.*, BIA/MS: Interacting biomolecular interaction analysis with mass spectrometry, Anal. Chem. 244, 124-132, 1997; and Wong *et al.*, Validation parameters for a novel biosensor assay which simultaneously measures serum concentrations of a humanized monoclonal antibody and detects induced antibodies, J. Immun. Meth, 209, 1-15, 1997.)

Using the catalog of the present invention, one skilled in the art can predict with the tested compound is a carcinogen. Compounds that results in the

production of nucleic acids, peptides or protein from the catalog, or a subset of catalog, are carcinogenic. To be able to predict carcinogenic, one need not use all of the nucleic acids or peptides of the present invention. For example, if one tested for all of the disclosed biomarkers and found 20% or more to be differentially expressed this would predict that the test compound is a carcinogen. Alternatively, one could use a sub-set of the biomarkers, such as, for example, 20-30 of the nucleic acids. With such a sub-set one would expect 70-80% to be differentially expressed when the test compound is a carcinogen. In addition, one could select only a few of the biomarkers, for example, 10, and look for 100% of them to be differentially expressed as an indication of a carcinogen.

mRNA, protein, or genomic DNA of the invention can be detected in biological samples including, for example, tissues, cells, or biological fluids from a subject such as blood, urine, or liver and thyroid tissue.

Various microarrays, beads, glass or nylon slides, membranes or other repeatable assay apparati can be constructed using the nucleic acids, peptides, and proteins of the present invention. These apparati can then be used to detect differential expression of these biomarkers. A non-limiting description of selected methods follows.

A. Microarrays

In one embodiment, the nucleic acids of the invention can be used to monitor expression. A microarray-based method for high-throughput monitoring of gene expression may be utilized to measure carcinogenesis biomarker hybridization targets. This ‘chip’-based approach involves using microarrays of nucleic acids as specific hybridization targets to quantitatively measure expression of the corresponding genes (Schena *et al.*, *Science* 270:467-470 (1995), the entirety of which is herein incorporated by reference; Shalon, Ph.D. Thesis, Stanford University (1996), the entirety of which is herein incorporated by reference). Every

nucleotide in a large sequence can be queried at the same time. Hybridization can also be used to efficiently analyze nucleotide sequences.

Several microarray methods have been described. One method compares the sequences to be analyzed by hybridization to a set of oligonucleotides or cDNA molecules representing all possible subsequences (Bains and Smith, *J. Theor. Biol.* 135:303 (1989), the entirety of which is herein incorporated by reference). A second method hybridizes the sample to an array of oligonucleotide or cDNA probes. An array consisting of oligonucleotides or cDNA molecules complementary to subsequences of a target sequence can be used to determine the identity of a target sequence, measure its amount, and detect differences between the target and a reference sequence. Nucleic acid microarrays may also be screened with protein molecules or fragments thereof to determine nucleic acids that specifically bind protein molecules or fragments thereof.

The microarray approach may also be used with polypeptide targets (see, U.S. Patent Nos. 5,800,992, 5,445,934; 5,143,854, 5,079,600, 4,923,901, all of which are herein incorporated by reference in their entirety). Essentially, polypeptides are synthesized on a substrate (microarray) and these polypeptides can be screened with either protein molecules or fragments thereof or nucleic acid molecules in order to screen for either protein molecules or fragments thereof or nucleic acid molecules that specifically bind the target polypeptides (Fodor *et al.*, *Science* 251:767-773 (1991), the entirety of which is herein incorporated by reference).

B. Hybridization Assays

Oligonucleotide probes, whose sequences are complementary to that of a portion of the nucleic acids of the invention, such as SEQ NO.:1-580, can be constructed. These probes are then incubated with cell extracts of a patient under conditions sufficient to permit nucleic acid hybridization. The detection of double-

stranded probe-mRNA hybrid molecules is indicative of biomarkers of carcinogenesis or sequences derived from rat liver hepatocytes treated with a nongenotoxic carcinogen. Thus, such probes may be used to ascertain the level and extent of carcinogenesis or the production of certain proteins. The nucleic acid hybridization may be conducted under quantitative conditions or as a qualitative assay.

C. PCR Assays

A nucleic acid of the invention, such as one of SEQ NO.:1-580 or complements thereof, can be analyzed for use as a PCR probe. A search of databases indicates the presence of regions within that nucleic acid that have high and low regions of identity to other sequences in the database. Ideally, a PCR probe will have high identity with only the sequence from which it is derived. In that way, only the desired sequence is amplified. Computer generated searches using programs such as MIT Primer3 (Rozen and Skaletsky (1996, 1997, 1998)), or GeneUp (Pesole, *et al.*, *BioTechniques* 25:112-123 (1998)), for example, can be used to identify potential PCR primers.

The PCR probes or primers can be used in methods such as described in Krzesicki, *et al.*, *Am. J. Respir. Cell Mol. Biol.* 16:693-701 (1997) (incorporated by reference in its entirety) to identify or detect sequences expressed in carcinogenesis.

These detailed descriptions are presented for illustrative purposes only and are not intended as a restriction on the scope of the invention. Rather, they are merely some of the embodiments that one skilled in the art would understand from the entire contents of this disclosure. All parts are by weight and temperatures are in Degrees centigrade unless otherwise indicated.

EXAMPLES

The following examples will illustrate the invention in greater detail, although it will be understood that the invention is not limited to these specific examples. Various other examples will be apparent to the person skilled in the art after reading the present disclosure without departing from the spirit and scope of the invention. It is intended that all such other examples be included within the scope of the appended claims.

Example 1

Rats were treated with phenobarbital for thirteen weeks or in a separate experiment, for 5 days. Liver mRNAs were extracted and probed for those mRNAs specifically altered by phenobarbital treatment by comparing with mRNA expression in untreated rats. The relative abundance of cellular mRNAs in rat liver was determined using PE GenScope's AFLP (Amplified Fragment Length Polymorphism)-based Transcript Imaging technology. The mRNA is converted into double-stranded cDNA, which is then cut with restriction enzymes. The resulting restriction fragments are tagged with specific adapters of known sequences, which allows for subsequent amplification of the fragments under highly stringent conditions. Similar technology has been used in plants (Money, T. et al., Nucleic Acids Res. 24:2616-2617 (1996), incorporated by reference in its entirety).

Specifically, rats were treated by oral gavage for 88 days in the 13 week experiment, or for 5 days with 200 mg/kg phenobarbital or control vehicle. The average expression levels of mRNAs for three phenobarbital-induced genes (P450 2B1, P450 3A1, and UDP-glucuronosyl transferase) were measured using RT-PCR, and showed substantial induction of mRNA expression levels as compared to control rats.

In one study, ten differentially expressed transcript derived fragments (TDF's) were isolated and cloned. For each TDF, four or five colonies were picked and their sequences determined using standard sequencing techniques. In each case, all colonies sequenced contained the same sequences. This is a reflection of the ability to reduce the complexity of the AFLP gel profile by using primers with additional selective nucleotides. The ten TDF sequences were BLASTed against GenBank. The identities of the bands were consistent with what one might predict would be altered by treatment with phenobarbital. PCR analysis of the samples confirmed that these genes are differentially expressed following treatment.

Example 2

Validation of AFLP Biomarkers by rt-PCR (Taqman)

After AFLP experiments were conducted, and results analyzed, the effects of phenobarbital on the expression of several biomarkers were validated. RNA was extracted from the same liver samples used in the AFLP study, in addition to liver samples from rats treated with phenobarbital for 2-weeks, followed by reverse transcription reactions to generate cDNA, followed by PCR, using Taqman technology. The genes analyzed for phenobarbital-induced alterations, and the corresponding AFLP sequence numbers are listed in Table 5, and a graph and a chart of the actual results are in Table 6 and Figure 1.

The results indicate that AFLP technology can find biomarkers. Eleven of the 17 (65%) genes analyzed were also determined to be differentially expressed using rt-PCR. However, this is based on comparisons at the same timepoint (13 weeks). When the rt-PCR analyses performed on the 2 week samples are considered, another marker (S-033) is found to be differentially expressed. Theoretically, differences in sensitivity and/or specificity between the two techniques could be accounted for these minor discrepancies. However, S-033 is an

example of how AFLP has identified biomarkers which are optimal for carcinogen detection at timepoints other than 13 weeks.

As noted above, the specific examples should not be interpreted as a limitation to the scope of the invention. Instead, they are merely exemplary embodiments one skilled in the art would understand from the entire disclosure of this invention.

TABLE 1

SEQ NO	Annotation*
275	rat mRNA for (S)-2-hydroxy acid oxidase
276	human NADH-ubiquinone oxidoreductase
277	rat mRNA organic anion transporter 3
278	Ula-1 RNA from transformed mouse cell line
279	rat hemoglobin alpha chain gene
280	rat mRNA for calcium binding protein
281	rat heat shock protein 27
282	rat mRNA for 50-kDa bone sialic acid
283	rat mRNA for lactate dehydrogenase
284	rat ribonuclease 4 mRNA
285	mouse Src-associated adaptor protein
286	rat mRNA for plasminogen protein
287	rat gene 33 DNA
288	rat mRNA for 50-kDa bone sialic acid
289	mouse glycolate oxidase mRNA
290	rat mRNA for cytochrome b5
291	mouse mRNA for tripeptidyl peptidase II
292	human eukaryotic protein synthesis init.
293	rat fatty liver acid binding protein
294	rat mRNA for ATP-stimulated glucocorticoid receptor translocation promoter
295	mouse apolipoprotein A-I/CIII mRNA
296	rat fibronectin (cell-, heparin-, and fibrin-binding domains)
297	rat mRNA encoding liver fatty acid binding
298	rat RoBo-1 mRNA
299	rat mRNA for pre-alpha-inhibitor, heavy chain
300	rat pancreatic secretory trypsin inhibitor
301	rat apolipoprotein A-IV mRNA
302	rat apolipoprotein A-IV mRNA
303	rat lecithin: cholesterol acyltransferase
304	mouse mRNA for very-long-chain acyl-CoA
305	rat Cyp3a locus
306	rat gene for alpha-fibrinogen
307	mouse protein phosphatase-1 binding protein
308	novel human mRNA similar to rat 45 kDa secretory protein
309	
310	rat retinol dehydrogenase type III mRNA
311	rat mRNA for lecithin-cholesterol acyltransferase
312	rat oxidative 17 beta hydroxysteroid dehydrogenase
313	rat hydroxysteroid sulfotransferase mRNA
314	mouse major histocompatibility locus cla
315	mouse ubiquitinating enzyme E2-230 kDA mRNA
316	mouse fatty acid transport protein 5 mRNA

317 rat (TSC-22) mRNA
318 rat SMP30 mRNA for senescence marker protein

TABLE 2

SEQ NO	Annotation
319	rat cytochrome P450
320	rat cytochrome P450b
321	rat cytochrome P450
322	
323	rat cytochrome P450 mRNA, 3' end
324	rat mRNA for carboxylesterase precursor
325	rat cytochrome P450e
326	rat aldehyde dehydrogenase (ALDH) mRNA
327	rat mRNA for carboxylesterase precursor
328	rat aldehyde dehydrgoenase (ALDH) mRNA
329	rat lipoprotein lipase mRNA
330	rat cytochrome P450IIB3
331	rat mRNA for P450IIIA23 protein
332	rat aflatoxin B1 aldehyde reductase
333	rat ,RMA for cytochrome P450 3A
334	rat testosterone 6-beta-hydroxylase (CYP 3A1) mRNA
335	rat mRNA for amyloidogenic glycoprotein
336	rat cytochrome P50 PB1 (PB1 allele) mRNA
337	rat epoxide hydrolase mRNA
338	rat mRNA for P450IIIA23 protein
339	rat CYP 3A1 mRNA
340	rat mRNA for hydroxysteroid sulfotransferase
341	rat mRNA for cytochrome P450
342	rat NADPH-cytochrome P450 reductase mRNA
343	
344	rat liver glutathione-S-transferase Yb-1
345	rat cytochrome P450 processed pseudogene
346	rat mRNA for glutathione S-transferase
347	rat NADPH-cytochrome P450 reductase mRNA
348	rat mRNA for P450IIIA23 protein
349	rat delta-aminolevulinate synthase mRNA
350	rat mRNA for glutathione S-transferase
351	rat mRNA for amyloidogenic glycoprotein
352	human GSTT1 mRNA
353	rat cytochrome P450IIB3
354	rat mRNA for glutathione transferase subunit 8
355	rat cytochrome P450IIB3
356	rat NADPH-cytochrome P450 reductase mRNA
357	rat glutathione S-transferase mRNA
358	rat NADPH-cytochrome P450 oxidoreductase
359	mouse mRNA for glutathione S-transferase
360	glutathione S-transferase
361	rat mRNA for glutathione transferase subunit 8

- 362 rat NADPH-cytochrome P450 oxidoreductase
363 rat cytochrome P450 PB1 (PB1 allele) mRNA
364 rat cytochrome P450 PB1 (PB1 allele) mRNA
365 glutathione S-transferase Yc1 subunit
366 rat 5-aminolevulinate synthase mRNA
367 rat cytochrome P450f mRNA
368 rat mRNA for polyubiquitin, 5' end
369 M. aureus mRNA for cytochrome P450IIC
370 preprocathepsin B (mouse, B16a melanoma)
371 rat phosphoglucomutase mRNA
372 rat malic enzyme gene, exon 4
373 rat mRNA for glutathione S-transferase
374 rat cytochrome P450 mRNA
375 rat cytochrome P450 mRNA
376 rat cytochrome P450 mRNA
377
378 human mitochondrial prostatein C3 subunit homolog
379 rat cytochrome P450 3A9 mRNA
380 rat cytochrome P450-1/PB- (ps) gene, exon
381 rat Hsp70-1 gene
382 rat cytochrome P450 mRNA
383
384 human mRNA for transcription factor BTF
385 mesocricetus auratus mRNA for carboxylesterase
386 rat aromatic L-amino acid decarboxylase
387 rat mRNA for putative progesterone binding protein
388 rat Y-b3 glutathione S-transferase mRNA
389 rat NADPH-cytochrome P450 reductase mRNA
390 rat cytochrome PB23 mRNA
391 UGT2B4, UDP-glucuronosyltransferase 2B4
392 rat glutathione S-transferase A3 subunit
393 rat mRNA for cytochrome b5
394 rat mRNA for glutathione S-transferase
395 rat cytochrome P450 3A9 mRNA
396 glutathione s-transferase Yc1 subunit
397 bilirubin-specific UDP-glucuronosyltransferase
398 rat cytochrome P450 mRNA
399 rat p450Md mRNA for cytochrome P450
400 mouse glutathione S-transferase class mu
401
402
403 rat mRNA for beta-tubulin T beta15
404 human micosomal glutathione s-transferase
405 rat transketolase mRNA
406 rat cytochrome P450 (female-specific and growth hormone-inducible) mRNA

- 407 rat cytochrome P450 (female-specific and growth hormone-inducible) mRNA
408 NPT4, sodium phosphate transporter
409 rah- ras-related homolog (mouse, HT4 neuro)
410 human mRNA for 16G2
411 rat mRNA for analicular multidrug resistance
412 rat UDP-glucuronosyltransferase UGT1A7 mRNA
413 human sodium phosphate transporter (NPT4)
414 rat liver apolipoprotein A-I mRNA
415 rat UDP-glucuronosyltransferase mRNA
416 rat apolipoprotein A-I gene
417 mouse gene encoding tetranectin
418 mouse COP9 complex subunit 7a (COPS7a) mRNA

TABLE 3

<u>SEQ NO</u>	<u>Annotation</u>
419	rat mRNA for hydroxysteroid sulfotransferase
420	Zfp-29 gene for zinc finger protein
421	human HFREP-1 mRNA
422	mouse ATP sulfurylase/APS kinase 2
423	
424	mouse secreted apoptosis-related protein
425	human zinc finger gene ZNF2
426	rat angiotensinogen (PAT) gene, exon 2
427	
428	mouse methyltransferase (Cyt19)
429	mouse activin beta-c precursor gene
430	
431	
432	
433	
434	rat mRNA for hepatic lipase
435	
436	human (H326) mRNA
437	human mRNA for KIAA00181 gene
438	
439	mouse mRNA for paladin gene
440	
441	mouse activin beta-c precursor gene
442	rat orphan receptor RLD-1 (rld-1) mRNA
443	mouse oncomodulin gene (exon 1)
444	rat kallistatin mRNA mRNA
445	
446	rat gonadotropin-releasing hormone
447	URP- nuclear calmodulin-binding protein gb113vrtp
448	mouse Jun co-activator Jab1 (Jab 1) mRNA
449	rat zinc finger binding protein mRNA
450	mouse inhibitor of apoptosis protein 2 mRNA
451	
452	rat mRNA for glutathione peroxidase I
453	mouse CRBPI mRNA for cellular retinol
454	mouse wagneri mRNA for heat shock
455	mouse NPC1 (Npc1) mRNA
456	
457	

TABLE 4

SEQ NO	Annotation
458	rat UDP-glucuronosyltransferase-2 (UDPGT)
459	rat ribosomal protein S12 mRNA
460	rat ornithine decarboxylase (ODC) mRNA
461	rat cytokeratin 8 polypeptide mRNA
462	rat mRNA for cathepsin L
463	human rho GDI mRNA
464	rat CLP36 (clp36) mRNA
465	annexin II, 36 kDa calcium-dependent phos.
466	
467	rat ribosomal protein S18 mRNA
468	rat ornithine decarboxylase (ODC) mRNA
469	mouse (C57BL/6) GB-like mRNA
470	cyclic protein-2, cathepsin L proenzyme
471	human p27 mRNA
472	rat c-myc oncogene and flanking regions
473	rat mRNA for canalicular multispecific
474	mouse cta-2-beta mRNA homolog
475	rat 3-hydroxy-3-methylglutaryl CoA reductase
476	rat stathmin mRNA
477	rat mRNA for Mx1 protein
478	
479	rat mRNA for protein phosphatase-2A catalytic subunit
480	rat mRNA for Mx2 protein
481	human mRNA for MUF1 protein
482	mouse MA-3 (apoptosis-related gene) mRNA
483	human BRCA2 region, mRNA sequence CG012
484	
485	pre-mtHSP70, 70 kDa heat shock protein
486	
487	house mouse mRNA for MAP kinase, kinase 3B
488	rat mRNA for 14-3-3 protein gamma-subtype, putative protein kinase C
489	human homolog of the <i>Aspergillus nidulans</i> sudD gene product

* ANNOTATIONS REPRESENT THE PREDICTION OF THE BIOLOGICAL FUNCTIONS OF THE SEQUENCES BASED ON SIMILARITY TO KNOWN SEQUENCES.

TABLE 5

SEQ. NO.	Gene
3	Rat P-450
4	Rat aldehyde dehydrogenase
6	Rat UDPGT1.1
10	Rat vitamin D-binding protein
179	Rat UDPGT
25	Rat cytochrome B
114	Rat delta-aminolevulinate synthase
129	Glutathione S-transferase
34	Rat liver catalase
38	Rat alpha-2u globulin
40	Rat NADP-dep.isocitrate dehydrogenase
42	Mouse JAK1 (protein tyrosine kinase)
230	Rat carboxylesterase
46	Rat cathepsin B
52	(s)-2-hydroxy acid oxidase
116	Estrogen sulfotransferase
92	Rat nicotinic receptor alpha 7 subunit

TABLE 6

SEQ NO.	Fold Change		
	2-week	13-week	AFLP
3	1.34	1.85	2.3
4	16.36	12.88	8.2
6	0.93	1.5	4.6
10	0.66	0.79	1.7
179	14.11	9.05	10.5
25	1.85	0.75	4.2
114	1.22	4.03	3.8
129	2.52	4.03	4
34	0.79	0.45	1.6
38	0.35	0.03	0.04
40	0.88	1.14	2.5
42	0.8	0.83	1.9
230	4.24	5.74	1.3
46	0.87	1.41	2.3
52	0.31	0.09	0.3
116	0.81	0.15	0.32
92	0.45	0.72	6.3

TABLE 7

Gene Description	5' Primer Sequence 5' to 3'	3' Primer Sequence 5' to 3'	Taqman Probe Sequence
Rat liver catalase	550	519	490
Rat Carboxylesterase	551	520	491
Rat cathepsin B	552	521	492
canalicular multidrug resistance protein	553	522	493
(s)-2-hydroxy acid oxidase	554	523	494
estrogen sulfotransferase	555	524	495
protective protein (heat shock proetin 90A	556	525	496
Rat hepatic alp-2u globulin	557	526	497
Rat transferrin	558	527	498
Cytochrome P450	559	528	499
Aldehyde dehydrogenase, rat	560	529	500
3-methylcholanthrene-inducible UDP gluc.trans	561	530	501
rat senescence marker	562	531	502
Vitamin D binding protein, Rat	563	532	503
RB binding protein 2	564	533	
UDP-glucuronosyltransferase 1	565	534	504
mitochondrial gene fragment, Rat	566	535	505
Rat delta-aminolevulinate synthase	567	536	506
human flavoprotein	568	537	507
alpha-2u globulin, Rat	569	538	508
glutathione-S-transferase	570	539	509
rat cytosolic NADP-dependent isocitrate	571	540	510
Protein tyrosine kinase	572	541	511
hepatic steroid hydroxylase	573	542	512
Nicotinic receptor, alpha sub. unit	574	543	513
Alpha B-crystallin, heart	575	544	514
Bos Taurus aldehyde oxidase	576	545	515
lambda-crystallin	577	546	516
Vav2	578	547	517
MDM2	579	548	518
DAD1	580	549	

WE CLAIM:

1. A substantially-purified nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ NO: 1 through SEQ NO: 580 or fragments thereof, substantial homologues thereof, and substantial complements thereof.
2. The nucleic acid molecule according to claim 1, wherein said nucleic acid molecule has a nucleic acid sequence of a fragment of one of SEQ NO: 1 through SEQ NO: 580 or a substantial homologue thereof or a substantial complement thereof and contains at least 40 nucleotides.
3. The nucleic acid molecule according to claim 2, wherein said fragment has at least 60 nucleotides.
4. The nucleic acid molecule according to claim 3, wherein said fragment has at least 100 nucleotides.
5. The nucleic acid molecule according to claim 2, wherein said fragment has a sequence that is identical or complementary to at least 50 contiguous nucleotides in one of SEQ NO: 1 through SEQ NO: 580.
6. The nucleic acid molecule according to claim 1, wherein said substantial homologues share at least 90% sequence identity with at least one of SEQ NO: 1 through SEQ NO: 580.
7. The nucleic acid molecule according to claim 6, wherein said substantial homologues share at least 95% sequence identity with at least one of SEQ NO: 1 through SEQ NO: 580.

8. The nucleic acid molecule according to claim 1, wherein said substantial homologues differ in sequence identity from at least one of SEQ NO: 1 through SEQ NO: 580 by no more than 5 nucleotides.
9. The nucleic acid molecule according to claim 8, wherein said substantial homologues differ in sequence identity from at least one of SEQ NO: 1 through SEQ NO: 580 by no more than 3 nucleotides.
10. The nucleic acid molecule according to claim 1, wherein said substantial complements share at least 90% sequence identity with at least one completely complementary sequence of SEQ NO: 1 through SEQ NO: 580.
11. The nucleic acid molecule according to claim 10, wherein said substantial complements share at least 95% sequence identity with at least one completely complementary sequence of SEQ NO: 1 through SEQ NO: 580.
12. The nucleic acid molecule according to claim 1, wherein said substantial complements differ in sequence identity from at least one completely complementary sequence of SEQ NO: 1 through SEQ NO: 580 by no more than 5 nucleotides.
13. The nucleic acid molecule according to claim 12, wherein said substantial complements differ in sequence identity from at least one completely complementary sequence of SEQ NO: 1 through SEQ NO: 580 by no more than 3 nucleotides.
14. The nucleic acid molecule according to claim 1, wherein said nucleic acid molecule shares between 95% and 100% sequence identity with at least one nucleic acid sequence selected from the group consisting of SEQ NO: 1 through SEQ NO: 580 and complements thereof.

15. The nucleic acid molecule according to claim 14, wherein said nucleic acid molecule shares between 98% and 100% sequence identity with at least one nucleic acid sequence selected from the group consisting of SEQ NO: 1 through SEQ NO:580 and complements thereof.
16. The nucleic acid molecule according to claim 1, wherein said nucleic acid molecule is a carcinogenesis biomarker nucleic acid molecule selected from the group consisting of SEQ NO:1 though SEQ NO:580.
17. An amplification primer selected from the group consisting of SEQ NO: 519 though SEQ NO: 580.
18. A detection probe selected from the group consisting of SEQ NO: 490 though SEQ NO: 519.
19. A substantially-purified carcinogenesis biomarker or fragment thereof encoded by a first nucleic acid molecule which substantially hybridizes to a second nucleic acid molecule, said second nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ NO:1 through SEQ NO:580 and complements thereof.
20. The carcinogenesis biomarker or fragment thereof according to claim 19, wherein said nucleic acid sequence is a carcinogenesis biomarker encoded by a first nucleic acid molecule which substantially hybridizes to a second nucleic acid molecule, said second nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ NO:1 through SEQ NO:580 and complements thereof.
21. A substantially-purified polypeptide encoded by SEQ NO: 1 through SEQ NO: 580.

22. A method of measuring the carcinogenicity of a compound comprising:
- a) exposing an animal to the compound; and
 - b) determining the presence or absence of a polypeptide encoded by SEQ NO:1 through SEQ NO:580.
23. A substantially-purified antibody or fragment thereof, said antibody or fragment thereof capable of specifically binding to the carcinogenesis biomarker or fragment thereof of claim 21.
24. A method of claim 22 wherein said carcinogenesis measurement is determined using a substantially-purified antibody or fragment thereof, said antibody capable of specifically-binding to a substantially-purified polypeptide encoded by SEQ NO:1 through SEQ NO:580.
25. A method for determining a level or pattern of a carcinogenesis biomarker in a cell comprising:
- (A) incubating, under conditions permitting nucleic acid hybridization, a marker nucleic acid molecule, said marker nucleic acid molecule having a nucleic acid sequence selected from the group consisting of SEQ NO:1 through SEQ NO:580 or complements thereof, with a complementary nucleic acid molecule obtained from said cell, wherein nucleic acid hybridization between said marker nucleic acid molecule, and said complementary nucleic acid molecule obtained from said cell permits the detection of said carcinogenesis biomarker;
 - (B) permitting hybridization between said marker nucleic acid molecule and said complementary nucleic acid molecule obtained from said cell; and

- (C) detecting the level or pattern of said complementary nucleic acid, wherein the detection of said complementary nucleic acid is predictive of the level or pattern of said carcinogenesis biomarker.
26. The method of claim 25, wherein said level is predictive of said carcinogenesis biomarker.
27. The method of claim 25, wherein said pattern is predictive of said carcinogenesis biomarker.
28. The method of claim 25, wherein said level or pattern is detected by *in situ* hybridization.
29. A method of isolating a nucleic acid that encodes a carcinogenesis biomarker or fragment thereof comprising:
- (A) incubating under conditions permitting nucleic acid hybridization, a first nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ NO:1 through SEQ NO:580 or complements thereof with a complementary second nucleic acid molecule obtained from a cell;
 - (B) permitting hybridization between said first nucleic acid molecule and said second nucleic acid molecule obtained from said cell; and
 - (C) isolating said second nucleic acid molecule.
30. A method of isolating a nucleic acid that encodes a carcinogenesis biomarker or fragment thereof comprising:
- (A) incubating under conditions permitting nucleic acid hybridization, a first nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of a nucleic acid molecule encoding for a carcinogenesis biomarker or complement thereof,

with a complementary second nucleic acid molecule obtained from a cell;

- (B) permitting hybridization between said first nucleic acid molecule and said second nucleic acid molecule obtained from said cell; and
- (C) isolating said second nucleic acid molecule.

31. A method for measuring the carcinogenicity of a composition comprising:

- (a) culturing a cell line;
- (b) exposing said cell line to said composition; and
- (c) determining the presence or absence of mRNA which substantially hybridizes to an at least one nucleic acid sequence selected from the group consisting of SEQ NO:1 through SEQ NO:580 and complements thereof.

32. A method for measuring the carcinogenicity of a composition comprising:

- (a) exposing a cell, tissue sample, or test mammal to said composition; and
- (b) determining the presence or absence of mRNA which substantially hybridizes to an at least one nucleic acid sequence selected from the group consisting of SEQ NO:1 through SEQ NO:580 and complements thereof.

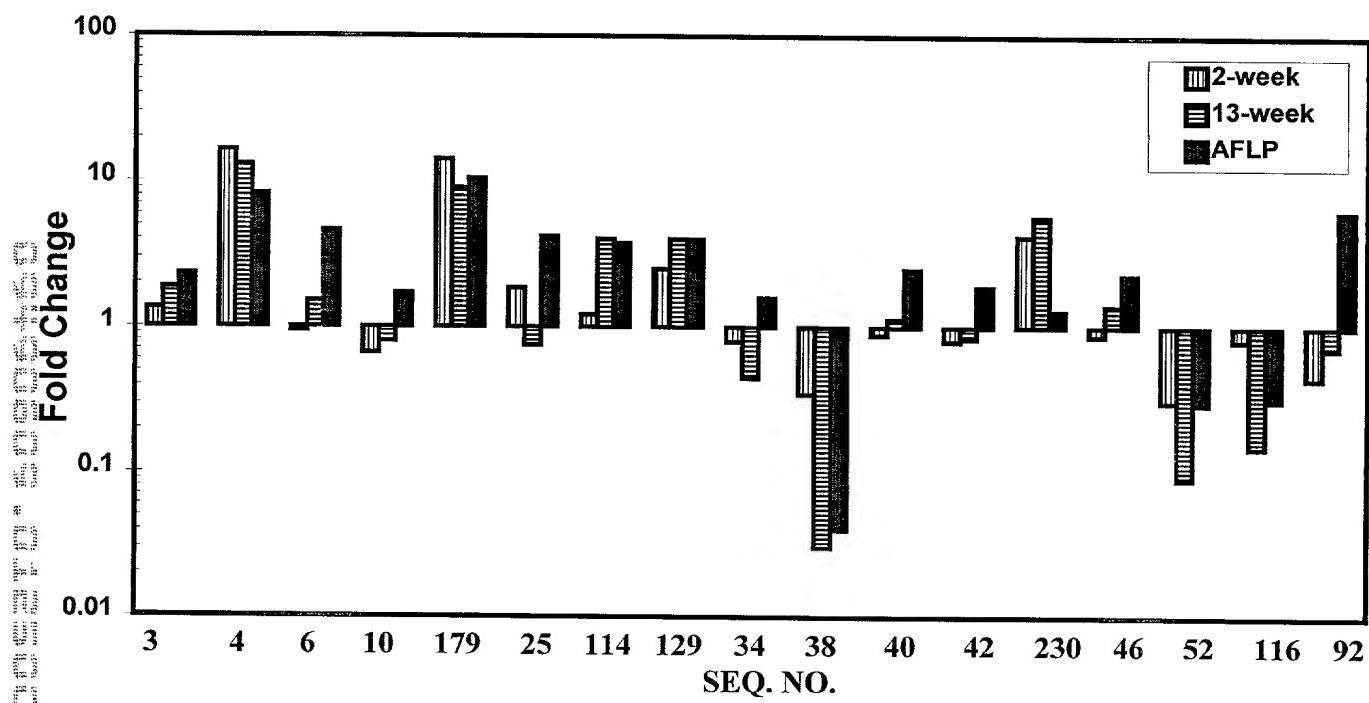
33. The method of claim 32, wherein said mammal is a rat.

ABSTRACT

The present invention relates to carcinogenesis biomarkers produced by phenobarbital-treated rat hepatocytes, nucleic acid molecules that encode carcinogenesis biomarkers or a fragment thereof and nucleic acid molecules that are useful as probes or primers for detecting or inducing carcinogenesis, respectively. The invention also relates to applications of the factor or fragment such as forming antibodies capable of binding the carcinogenesis biomarkers or fragments thereof.

FIGURE 1

**Comparison of mRNA Levels of Differentially
Expressed Transcripts: Taqman (2- and 13-wk samples)
versus AFLP (13 wk)**



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<160> 580

<210> 1

<211> 271

<212> DNA

<213> Rattus norvegicus

<400> 1

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120

gaaacaaaaa tattttgtta atcatcaaat ttatactagc tatctgggtg ttagcatatc
180

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<213> Rattus norvegicus

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120

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<213> Rattus norvegicus

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120

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cgggcgttca tcacacactc ccggttccca tggatttat gaaggaatat gcaatggggt
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<213> Rattus norvegicus

<223> unsure at all n locations
<400> 37

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agggacaata tcattgacct aaccaagact gatcgctgtc tccaggcccc aggttgaaga
120

aaggcctgag cctccagatt gcagggcaag atccagttag agcaagantg cttctctgtc
180

cagaagtcaa tccaaagaagt gctta
205

<210> 38
<211> 177
<212> DNA
<213> Rattus norvegicus

<400> 38

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tagggacaat atcattgacc taaccaagac tgatcgctgt ctccaggccc gaggttgaag
120

aaaggcctga gcctccagag tgccctcttg tccagaagtc aatccaagaa gtgctta
177

<210> 39
<211> 157
<212> DNA
<213> Rattus norvegicus

<400> 39

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cagagttctg ggagagggaaa gctcccccag gcctattcct ctcccaatta ttggcaatat
120

ctttcagcta aatgtgaaga acatcaccca atcctta
157

<210> 40
<211> 413
<212> DNA
<213> Rattus norvegicus

<400> 40

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aggcttcatac tgggcctgtta agaactatga tggtgatgtg cagtcagact cagtagcccc
120

aggttatggc tcccttggca tcatgaccag tgtgctgatt tgtccagatg gtaagacgg
180

agaagcagag gctgccatg gcactgtcac acgtcaaac cgcatttacc agaaaggaca
240

ggagacgtcc accaatcccc ttgcttccat ttttgcctgg tcccgggggt tagccccacag
300

agcaaagctt gacaacaata ctgagctcag cttctttgca aatgctttgg aagaagtctg
360

cattgagacc attgaggctg gctttatgac taaggacttg gctgcttgca tta
413

<210> 41
<211> 346
<212> DNA
<213> Rattus norvegicus

<400> 41

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tccttaccct cttgcctcta tagagaaagt gctgggattt caggcagatg acacacccgt
120

ccaacaactg gttcataaaag gcagatgcag ggtacttcac acacactggg ctgggcagct
180

gggactgcc a gggagaggc cttgcatac atgaaagtgg acagggacag ctctgggtt
240

taggcaggaa tagacaaagg tgacaaggct cacgaccta gggacaggag tccctgttag
300

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346

<210> 42

<211> 292

<212> DNA

<213> Rattus norvegicus

<400> 42

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cggagggaat ggtatcaagc tcatcatgga gtttctgcct tcgggaagcc taaaggaata
120

tctgccaagg aataagaaca aaatcaacct caaacagcag ctaaaatatg ccatccagat
180

ttgttaagggg atggactatc tgggctctcg gcaatatgtt caccggact tagcagcaag
240

aaatgtcctt gttgagagtg aacaccaagt gaagatcgg a gactttggtt ta
292

<210> 43

<211> 239

<212> DNA

<213> Rattus norvegicus

<400> 43

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acagctaacc aagtatttcac gtacccgtga ttctgtgggt tagctaagct cctttgagca
120

gctctactag tgtggctgg tcctgctcat gagccagtc acttctact tcagctgggg
180

ctggtaggc tgggtcacc cagccattgt agcaagtgtt gggtgcattg gcttggtta
239

<210> 44

<211> 121
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 44

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60

ctttttgcgc cggttcttact tcacttgca gaagaagtgt gccagcacat cccctacgtt
120

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121

<210> 45
<211> 117
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 45

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caggccagtg ccattattta ggcttgca gtggggatta cttcaagcag tggatta
117

<210> 46
<211> 105
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 46

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60

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105

<210> 47
<211> 52
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 47

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52

<210> 48
<211> 442
<212> DNA
<213> Rattus norvegicus

<400> 48

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gtcatcacca tcgctcacag gctgcacacc atcatggaca gtgacaagat aatggtccta
120

gacaacggga agattgtcga gtatggcagt cctgaagaac tgctgtccaa cagagggttcc
180

ttcttatctga tggccaagga agccggcatt gaaaatgtga atcacacaga agctctagca
240

gctggttccg tggctggcgg gactataaga acagtttcta ttatggctt tgggtttctg
300

tgactgtgct ctaggtgcaa agacacatat tttgttcccg ttgctcaggc tgggcctcaa
360

actctaaggt ccagcaatct ctggtctcag ccagagacct gtaaaaatag acacttcaa
420

gattatcatg aataaatatt ta
442

<210> 49
<211> 227
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 49

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gagtgtggcc cgccgggtcc tccaaggcct ggangggctg aaaatggtgg aaaaggacca
120

agatggggcc gcaagctaac acctcaggaa cagagagatc tggacaggat cgccggacag
180

gtggcatgct gccacaaga agcattagaa caaaggatgc tgggtta
227

<210> 50
<211> 248
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 50

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60

acggacacaa gaggaatatc cccttggaaatg gaaccaagtgc gaaagaatgac gctgtgagac
120

tggatagtta tggtgcctca agctgatcct tctgagtggg cggggcttagc accccagtgt
180

ccatcaagca aggtcttatcc ttcttgagtgg gcaggcttagc actccagtgt ccagnnattc
240

cagtctta
248

<210> 51
<211> 113
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 51

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60

acatcgaaaa gtactttggg aggntgttgg agtatttnnt gattcaagcc tta
113

<210> 52
<211> 198
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 52

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atcataaccta gtagtttgag ccctctacct tgagaaatcc agatggatga agaaaagata
120

gctaacagct accagagggt gcatttggat gaaggaataa catctaattgt tntacaggat
180

aacnntaact gacaatta
198

<210> 53
<211> 166
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 53

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aggcaacacc tccttcagtc tggagnnaac tctaaatagt gtgaccatgt aggacagagt
120

aaagggcagg gagtgaatta gagaagagtt ggnngtctgg ggatta
166

<210> 54
<211> 190
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 54

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atggggattg gtttttcgat tgtcgtggcc tctgacaaaa gagaaaagat agaagagaac
120

ggcagcatga gagttttgt gcagcacatc gatgtcttgg agaattcctt aggctncnag
180

ttccgtattta
190

<210> 55
<211> 178
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 55

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60

cagtgcgtg acgtnacttc taatagacga naattagana cagcctgctt gcccataaca
120

ggaaagtgtat cactgagatg atagcgtgtc catttgatgg gccncctcag caacgtta
178

<210> 56
<211> 240
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 56

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60

gctcaacaac tacagaacgc acctcccgtt ctctctgctc taagatgcta aatatgaaag
120

ccagngtttc acagcccaga tcatccacng cactgcttta ctgattcgga agtttcttctt
180

gaggatactc cagatacacc tgagacatta tanatcatat atcaannngc acaaataatta
240

<210> 57
<211> 222
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 57

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60

taccagtgtc gctgtaactg aagaaatgcc acccctggaa ggagatgtatg acacatcacg
120

catggaagaa gtagactagg ctccaccagn actatgtgtt tgatgcttac ctccattcct
180

tctgatnata tattttccat gatTTTNGNT ttatTTTGT TA
222

<210> 58
<211> 112
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 58

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60

tcataatnaca atttatgnnc cttgtgtca ttgtgnnccc attcctgagt ta
112

<210> 59
<211> 176
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 59

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60

gaagaaaagct agnacaaatg cagaagaaaag atgtctgatc tgcccttcat gttngagtt
120

tgtgagtgtg tgcatgangc ctctgttcag atcntgtgct nnngtttagc cattta
176

<210> 60
<211> 91
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 60

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60

ggtgacacgg ggcttggnnn acacaacctt a
91

<210> 61
<211> 332
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 61

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60

aacactctat cacatcacan tgtggacatt ctccttgcc ctgggacact tcntctcgga
120

gttgtttgta tttgggnacag cggctcccac agttggtgtg ctggcacccct tcatggtagc
180

aagtttctca atcctggta tgctagttgg gctccggta ctanaaggag aaccagtatc
240

cagacagaag naaagaaatt gaggccancc ttgnncagtc tgatacatca tggtnntcca
300

cctttgctct nttnncac tctctgtcct ta
332

<210> 62
<211> 274
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 62

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acaatatcat tgatctaacc aagactgatc gctgtctcca ggcccgagga tgaagaaagg
120

cctgaggctc cagtggnnnn nnnnnnnnnn nncaccagga ctctagcatc accatttcct
180

gtccatggag catcctgaga caaattctgc gatctgatgt ccattctctg tcacagaaaa
240

gtgcaatcct gtctctccag ctctcccta atta
274

<210> 63
<211> 70
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 63

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60

tatctgctta

70

<210> 64
<211> 280
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations

<400> 64

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ggccacttac tataggtnat aaggtcactg tgnccctcag caggnccaag cactgcattgt
120

aggaaaggaa gggtccagga gctgtccaga gcgccattta gctctcccttc tgtttaggaa
180

ataaaagacag agtgtgcaaa gagaggcagt cagcactccc tcntgctcag ggaaccctgg
240

acagctgtgg acaggcatgg ggtannncta ctcttcatta
280

<210> 65
<211> 202
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations

<400> 65

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agacagacag gccatcagtg tggaatgtcc gagaaggcga ttgaaaagtt tatcagacag
120

ctactcgaaa agaatgactc aaagggacca ccccagtacc ctctcattat agccatgtat
180

aagtcnctn actctggat ta
202

<210> 66
<211> 162

<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 66

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60

ggccaatgac accacgttng gactagcagc tgggtcttt accaggacat tcagaggcgc
120

acaggtggcg gctgagctnc aggccgcnaa cgtgctacat ta
162

<210> 67
<211> 57
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 67

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57

<210> 68
<211> 131
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 68

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60

tgtagtaaan agagaatgtc tttagtgtggt tgtgagtgac agtcaaattc aatgnncnta
120

aaaggacatt a
131

<210> 69
<211> 77
<212> DNA
<213> Rattus norvegicus

<400> 69

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60

gagaagacac ctgttta
77

<210> 70
<211> 353
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 70

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acactttgga actgggtggtg tagccctcag tatcatcttg aacaccagtt ggggttcctg
120

cagtccctt tgtgcttcac tgggttttgg acgaaggagt gaggccctg cttcctgtca
180

tgttgtact gtgtgtgt gcgtgactat ctggtaag tccgtcaag aagatgaaag
240

tccacagcaa aaggcangtt cgattcccag tgcctgctca cagctgcctg tatcttgatc
300

tgcaggggac cctgtgcctc tggtttctgt ggatacaaatt gtgtatgccc tta
353

<210> 71
<211> 187
<212> DNA
<213> Rattus norvegicus

<400> 71

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gctcttaat caccacgacc atcacgatga attctgcctt atgccttgac ttccggtcatt
120

tcccctgaga ttcatactgt gattcccgct gtattcctag cccttgatt ttccctgacat
180

gccttta
187

<210> 72
<211> 116
<212> DNA
<213> Rattus norvegicus

<400> 72

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60

atctgagccc caatgcttc tacacaccag aattctatct tttagcagtg acttta
116

<210> 73
<211> 147
<212> DNA
<213> Rattus norvegicus

<400> 73

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60

gttattagca gaatgaagga tggcctaaa cgaagaaaga tgcacaccc tcgaggctc
120

tcagaatgct ggatagaggc ttactta
147

<210> 74
<211> 195
<212> DNA
<213> Rattus norvegicus

<400> 74

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ccccctgtgga gagggagaaa gaaagggag ccgctgacct gcagggatac agacttccc
120

cacagcctgg cagccgccccg tttgttgcag cttattatca gactgtggc tatcatagtt
180

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195

<210> 75
<211> 100
<212> DNA

<213> Rattus norvegicus

<400> 75

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60

ttgaacaact tatttcctt gtatcgatag agggtgctta
100

<210> 76

<211> 395

<212> DNA

<213> Rattus norvegicus

<400> 76

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ctgcctggtc tgtctcatcc tgtcttctga gagcgtggtt cacagacatt gtgtctgagt
120

gaagggaacc caggttcaga ttccgtttct ctgcttctgt cttttctca gcagcagggt
180

aggaacaggc cttttgtgca catacaacag atgaagccca ttagatgatct gtggaaaca
240

ccaacactca tgcaccctgt gggtgaccct ccctacacag cgccagagcag agagagcccg
300

ggaggtgctg caggcttcac tgagcttcc ttgcccaagac tggcaaccga ctttgctctc
360

ttttgaaaa ctctagctaa agtcagcgtt gttta
395

<210> 77

<211> 56

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 77

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56

<210> 78

<211> 164

<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 78

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60

gccttacaac atcgctcaca tggaggccaa gggagcagcc gtgaaagtgc ccatcaacac
120

gatgaccagc gcagattgc tcagtgcctt gagagcggtc atta
164

<210> 79
<211> 207
<212> DNA
<213> Rattus norvegicus

<400> 79

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60

tggggcctt gggctgccc ccactgttgc ccacgtggat ggtaaaacct acatgctatt
120

tgggtctgac cgcatggagt tgcttagcta cctgcttagga gagaagtggta tggccctgt
180

ccccccaacc ctgaatgcc aacttta
207

<210> 80
<211> 112
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 80

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60

atgacacatc ccggagttg ccacactagc aagagcctgg ctgnttcctt ta
112

<210> 81
<211> 183
<212> DNA

<213> Rattus norvegicus

<400> 81

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60

gcacaattcc tgtgtgagtt ggaatgatgt atttgcttac caaagctcaa gatcatccac
120

aggacaacca cagagtccac atcaaaggag agaggtggtc tttgttgate cagactggcc
180

tta

183

<210> 82

<211> 118

<212> DNA

<213> Rattus norvegicus

<400> 82

gatctcctgg ttttctaaaa gactgaccaa taattttca catgtcagaa tctgttatgt
60

ttgtctgacc tccatggag attttgttc tggctaaaat aaaggctaaa taagctta
118

<210> 83

<211> 264

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 83

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tgtggtaga tggggacagg agttttctc cttgcctt ctggggatgg agaaggctaa
120

aaccaagncc atgttgtctg gagaggtgca cccaggggtg aagggtctg agaggcattc
180

cacctaccct cagagagcct gggttcctca ggggctcagt ggggcagcac ttttgttat
240

tgtcgata agttcgtagc atta

264

<210> 84
<211> 60
<212> DNA
<213> Rattus norvegicus

<400> 84

gatctccag gactcaagac accagttggc agaggaagag cctggcttcg gttggcatta
60

<210> 85
<211> 136
<212> DNA
<213> Rattus norvegicus

<400> 85

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60

tagccctggc tgtcttggaa ctctgttagac tgggctggct tctgactcag agctctgcct
120

gcctctgctg ggatta
136

<210> 86
<211> 85
<212> DNA
<213> Rattus norvegicus

<400> 86

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60

ctaagatgca tataaagggg agcta
85

<210> 87
<211> 145
<212> DNA
<213> Rattus norvegicus

<400> 87

gatccaaaga tttctaactt ggctcccttg ggcattcctc gaaggattat caagaacaca
60

accttccgtg gttttttctt ccccaagggc accgatgtgt tcccttatatt aggttctctg
120

atgacagacc caaagttctt cccta
145

<210> 88
<211> 346
<212> DNA
<213> Rattus norvegicus

<400> 88

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60

ctcactaagt gacaataacct tccctgcaga cccactaata cacgcttcct tcataatccta
120

ctcaggaagt gaccatgtca actgagccct tctgactgac tgtccgactg tccttgtcaa
180

ttgccactct catgtcccct ccctctctca ctgccacact cctccatcag catgttagaga
240

gtgtcttttt caactttggt ctttcctttt gtggacaaca tttctgcaaa agagcaaggg
300

tctggaaacctt gccctggcct ctgacccttg gatgtgtgtg ctgcta
346

<210> 89
<211> 205
<212> DNA
<213> Rattus norvegicus

<400> 89

gatccagagt tcaaggtcag cttggataac atatgcagtt ccagaccaac ctggatata
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ggagaccca tctaaaaaaaaa acaaaccaac cctgccctcc agtaaccgtc caggagagt
120

tgggtggtgca ggctgagccg ctctataaccc agcctctgag aactttgtcc tctcgcaac
180

ttgatagcct gcgggtggtt ggcta
205

<210> 90

<211> 211
<212> DNA
<213> Rattus norvegicus

<400> 90

gatccagaag acatcacaaa taatccttta gaatagtctt tggcaactg ggccttcgt
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acctgtatca gagagaattc tggggggctt cgaggcaccc tacactccat gctccagttt
120

tcagccgccc ccacccacc cccatcttt tagtcttacc tgagggttgt tgacagcctg
180

cctatgtttt ctctgttgta ttcctaccct a
211

<210> 91
<211> 166
<212> DNA
<213> Rattus norvegicus

<400> 91

gatccatagt atagtcctcg tcccacatgg aggaataggc agatgaaaaa tattgaggcg
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ccgttggcgt gtaggtatcg gattagtcag ccgttagttt cgtctcggtca gatgtgggtg
120

actgatgaaa atgctgttat ggtatcagac gtgttagtgc ttgcta
166

<210> 92
<211> 148
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 92

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60

tgaggtttcc tcattgcattt cgatagggtt atcatgattt cccccactaac tcattttctg
120

gctggccctt tttatanaac tcggcccta
148

<210> 93
<211> 52
<212> DNA
<213> Rattus norvegicus

<400> 93

gatccatgga ggtggactaa taatagcgga gcatcaccct atagtgtgac ta
52

<210> 94
<211> 43
<212> DNA
<213> Rattus norvegicus

<400> 94

gatccatttc ttttagcagtt gaaacagctg gccattgtaa cta
43

<210> 95
<211> 228
<212> DNA
<213> Rattus norvegicus

<400> 95

gatcccagcc gtcgtggatc ctctcaccat tacttcttcc ctgtcatcgg atggagtc
60

cactgtgaat ggaccaagga aacaggcctc tggccctgag cgccaccattc ccatcacccg
120

tgaagagaag cctgctgtca ctgcagcccc taagaagtag attcccttcc ctgcgttgc
180

tttttaagac aaggaagttt cccatcagcg aatgaacatc tgtgacta
228

<210> 96
<211> 103
<212> DNA
<213> Rattus norvegicus

<400> 96

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60

ccagtgtggt tcttgctggg cttttagcgc atcgggttgc cta
103

<210> 97
<211> 343
<212> DNA
<213> Rattus norvegicus

<400> 97

gatccccggg aacaatcttg ctcaggccc ctcccccga actccctgcg atgccccatc
60

ccccttgctt tgaaagccct tctaagctcg gcctgagaac tcctcctcac ctttcaccct
120

tcccagccca aggctccgag ggtcccatca gtgtgtatga gtctggcctt ttagctttc
180

ttgacaattc ctaatggttc taaagcctgg agccccggaa aactgtgagc taaggagaca
240

tagcacaaaa tcataaatga gttgcgggaa gaggctggaa acagtgtgca agaaatacag
300

gccaggggtt ggggatttag ctcagcggta gagcgcttgc cta
343

<210> 98
<211> 50
<212> DNA
<213> Rattus norvegicus

<400> 98

gatccccatt agcttgtgcc tgtggccaga aaaggccaaa gccagcccta
50

<210> 99
<211> 48
<212> DNA
<213> Rattus norvegicus

<400> 99

gatccctggg gtttgctggc cagccagaag ctgcattgtt gagctcta
48

<210> 100
<211> 72
<212> DNA
<213> Rattus norvegicus

<400> 100

gatccctaca agaggaagac aagacttcaa catagtgtgt gaggctattc ttcttcggtc
60

cgatcataacc ta

72

<210> 101

<211> 200

<212> DNA

<213> Rattus norvegicus

<400> 101

gatccctgcc atctgcgaca tccccaccga gatgcacatt tctttttgc ccccatccga
60

acactcaaac accctgtatt catctaaggg tctgggagag tctgggtgt tcctggctg
120

ttcggtatattt tttgccatcc atgacgcagt gagggcagcg cgccaggaga gaggcatctc
180

tggaccatgg aagctcacta

200

<210> 102

<211> 143

<212> DNA

<213> Rattus norvegicus

<400> 102

gatccgagag aagcaagcag caaacaaaaa cttcccttcc tctgtgcattg acaaccgcca
60

ctgttttag aactccggat actactttga ctctggcttg gggcgaagga agtgcacccc
120

agatcaaaag caacacattt cta

143

<210> 103

<211> 343

<212> DNA

<213> Rattus norvegicus

<400> 103

gatccgaagc aggtagccct gagtcattat ggcgctctct gacttcagca atcagcagcc
60

cttacaatcc tgcaaggatt ccacccaagt cagcagcagt cacgggcctc cttcactgat
120

gtgtgttctg cctgctcagc ccctgccaca gaggcctgga ggtgtggag tgtggctaa
180

gcacagtctg ccatccttga ccgcagacct cttggaccca cccccactcc ctccagacac
240

tggtaagaga agccttcctg caacatgtcc tgtcctcagg aggtgagaca gcagagtgt
300

tccattcact cgatgacccc atttttgctc ttcccttggg cta
343

<210> 104
<211> 41
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 104

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41

<210> 105
<211> 67
<212> DNA
<213> Rattus norvegicus

<400> 105

gatccggagg aactacagag acatggatat ctacgtcaca gccaatggca ttgatgatct
60

tgctcta
67

<210> 106
<211> 192
<212> DNA
<213> Rattus norvegicus

<400> 106

gatccgggag cattcccttt gcagtgtcat agataccgaa gtaggcagca cggttagatga
60

taatgccctg cactgacaca ttaaaggcctt ggtacaggcc cttaatccca tcagatttgt
120

agatcttaac caggcagtca ccaaggcctt tgaattccct ttcagctcca gctttgccca
180

catcagctgc ta

192

<210> 107

<211> 97

<212> DNA

<213> Rattus norvegicus

<400> 107

gatcctatga tcctgaacgg cagcctgtgc tctctgtcta ccagccagag gacaaccttg
60

gaggctctcc cgagactccc tgtactcacc cctgcta
97

<210> 108

<211> 42

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 108

gatcctatcg tgacctgttg gacangaagg gagtgttgc ta
42

<210> 109

<211> 67

<212> DNA

<213> Rattus norvegicus

<400> 109

gatcctatct taaaatctaa tgaaatctag ggttggggat ttagctcagt ggttagagcac
60

ttgccta

67

<210> 110

<211> 207

<212> DNA

<213> Rattus norvegicus

<400> 110

gatcctcacc gtggaggacc actactatga aggtggcata ggcgaggcag tatctgctgc
60

ggttagtggc gaacctggag tcacagtac tcgcctggcg gtcagccaag taccacgaag
120

tggaaagcca gctgagctgc tgaagatgtt tggtattgac aaagacgcca ttgtgcaagc
180

tgtgaagggc cttgtcacca agggcta
207

<210> 111

<211> 271

<212> DNA

<213> Rattus norvegicus

<400> 111

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60

ttcacaatct ttccctgtga tgaattagca tctccagtc tctgcctata tagtagatat
120

ggaccacaaa gaagtaaata atggtgtca attttgcata aggaatctt agaggcccac
180

acaattccaa attctcaattt catgtcagag attgaatgtat tgaaaagctt tctgcagtaa
240

attatttacc ctatttctt agcatgtact a
271

<210> 112

<211> 415

<212> DNA

<213> Rattus norvegicus

<400> 112

gatcctcaa gtggctcagg aacactttgg caaaggcaaa tcaaaagact tccaaactgtt
60

cggctctcct cttggaaag acctgctgtt taaggattct gcctttggc tttacgggt
120

gcccccaagg atggactaca ggctgtacctt cggccacagc tatgtcactg ccattcgaaa
180

tcagcgggaa ggcgtgtgcc cggagggctc catcgacagc gcgccagtga aatggtgtgc
240

actgagtcac caagagagag ccaagtgtga tgagtggagc gtcagcagca atggcagat
300

agagtgttag tcagcagaga gcactgagga ctgcattgac aagattgtga atggagaagc
360

agatgccatg agcttggatg gaggtcatgc ctacatagca ggccagtgtg gacta
415

<210> 113

<211> 152

<212> DNA

<213> Rattus norvegicus

<400> 113

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60

gtgctgggtg taagaccaca ccctccagag ggaagaaagg ctccctctcg gttgtgcgc
120

tgactttctt atactgctcc ttgtgccac ta
152

<210> 114

<211> 295

<212> DNA

<213> Rattus norvegicus

<400> 114

gatcctgaag agcaatgagg gacgtgcctt ttgcggcca gcaccagcgc aatgtcaagc
60

ttatgagga gatgtaatg gacgctggcc ccccagtcat ccactgcccc agccacatca
120

tccctgtgcg ggtgcctga tgctgctaaa aacacagaaa tctgtatga agttgtatgc
180

caggcataat atctacgtcc aggccattaa ttacccaaca gtgcctcgtg gggaggagct
240

cctccggatc gccccaccc cgccaccac accgcagatg atgaacttct tccta
295

<210> 115
<211> 76
<212> DNA
<213> Rattus norvegicus

<400> 115

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60

ccaagctgat ttgcta
76

<210> 116
<211> 290
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 116

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60

cctgaagccc tgaggagag atttggagg cactaccagc ggcataatgaa ggactgccct
120

gtgaagtttta gagcagagct ctgagacact tccttgttc tgaaattgga gtagtctcca
180

atttatcctt cagttttct tggtaat tcagtagaaag tagaagtctt ttgaagactg
240

atggtttaaa ttcattctgg tttttaaac naacntttat tttaatctac
290

<210> 117
<211> 228
<212> DNA
<213> Rattus norvegicus

<400> 117

gatctaacca agactgatcg ctgtctccag gcccgaggat gaagaaaggc ctgagcctcc
60

agtgctgagt ggagacttct caccaggact ccagcatcac catttcctgt ccatggagca
120

tcctgagaca aattctgcga tctgatttcc atcctcttc acagaaaagt gcaatccgg
180

tctctccagc atcttcccta gttacccagg acaacacatc gagaatta
228

<210> 118
<211> 93
<212> DNA
<213> Rattus norvegicus

<400> 118

gatctactta aaaactgctt cgtgacaaaa accacacctg aagaaatttt aagaatttgg
60

cacagtttagt cactttgtgt cacccggaat cta
93

<210> 119
<211> 145
<212> DNA
<213> Rattus norvegicus

<400> 119

gatctacacc acagtttcta acatggacaa cattacagcc atgaagtagc agtggaaata
60

acttgatggt gggggaaatc accagaatat gaggaactgt attaaagggt cgccgcattc
120

ggaagggtga gaagccactg ggcta
145

<210> 120
<211> 34
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 120

gatctacatt ggaaggcgtn gacaactanc acta
34

<210> 121
<211> 45
<212> DNA
<213> Rattus norvegicus

<400> 121

gatctaggcc ccttcctcc tctaaccctc tttctctcct gccta
45

<210> 122

<211> 363

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 122

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60

ctgatgaagt accncacatg tcacagctaa agtccaggaa gagattgacc gtgtgattgg
120

cagacatcgc agccctgca tgcaggatag aaaacacatg ccctacacag atgccatgat
180

tcatgaggtt ncagagattc attaactttg tcccgaccaa cctgccccat gcagtgacct
240

gtgacattaa attcaggaac tacctcatcc cgaaggaaac aaaagtgtta acatcactga
300

catcagtgct gcatgacagc aaggagttcc ccanccana gatgttgcc cnanccactt
360

cta

363

<210> 123

<211> 132

<212> DNA

<213> Rattus norvegicus

<400> 123

gatctcaggg gaggtatgct taaggccaga gctttcctc agtatttgat tttccagtg
60

tttgttttt taaaaactga caggtgtac atttctatct gttggttca attctgcccatt
120

atttcatgtc ta

132

<210> 124
<211> 89
<212> DNA
<213> Rattus norvegicus

<400> 124

gatctcagca gcctgggtgt cacagtagaa taagaatggc tggccttaac cttccctgtg
60

agtgacgtga atgaatgcct acctggcta
89

<210> 125
<211> 206
<212> DNA
<213> Rattus norvegicus

<400> 125

gatctcattg atcacagcct gggtgttaggg catcttcatg tggtcctcat actgaggctg
60

tcggttcctg ccgatcacct gctcaatttc ctcatggacc ttggcctcca catctggatg
120

cttcatgagt agaaggaagc cgtacgttag tgtggagctg actgtctcag acccagcaaa
180

gaagaggctt agtgttgtca tcacta
206

<210> 126
<211> 71
<212> DNA
<213> Rattus norvegicus

<400> 126

gatctcccag atcaagtccct cttgccatc tccatttcga gccacaacag catgagaagg
60

gatccgggct a
71

<210> 127
<211> 129
<212> DNA
<213> Rattus norvegicus

<400> 127

gatctccgg ggagtgtatgc tggaagaaag gcaaagccag aaactcaata aagtatgacg
60

ttaaacgtgt ggccctccagg tgctttctta ctgtttgcca aaattgagct gcctcaagac
120

aaggta

129

<210> 128

<211> 247

<212> DNA

<213> Rattus norvegicus

<400> 128

gatctctccc gagagacaca gccagaatac agcaaataca taggcaaatg ccagcagcaa
60

accaccgaac tgaaaacggg acccccgtt aaggaatcag agaaaggact ggaagagctt
120

gaaggggctt gagaccccat atgaacaatg ccaagcaacc agagcttcca gaaactaagc
180

cactacccaa agactgtaaa tggactgacc ctgggctcca acctcatagg tagcaatgaa
240

tagccta

247

<210> 129

<211> 347

<212> DNA

<213> Rattus norvegicus

<400> 129

gatctctgcc tacatgaaga gcagccgcta cctctcaaca cctatatattt cgaagttggc
60

ccaatggagt aacaagttagg cccttgctac actgggcact cacagagagg acctgtccac
120

attggatct gcaggcaccc tggccttctg cactgtggtt ctctctcctt cctgctccct
180

tctccagctt tgtcagcccc atctcctcaa ctcacccca gtcatgcccc catagtcttc
240

attctccccca ctttcttca tagtggtccc cttcttatt gacacctaa cacaacctca
300

cagtcctttt ctgtgatttg aggtctgcc tgaactcagt ctcccta
347

<210> 130
<211> 431
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 130

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60

accgccttgg caaaagacag gacaaaaaac cggtacttgc ctgccttga aaaggtgttg
120

aagagccatg gccaaagacta cttttaggt aacaggctga cccgggtaga catccacctg
180

ctggaacttc tccttatgt tgaagagttt gatgccagcc ttctgacctc ttccctctg
240

ctgaaggcct tcaagagcag aatcagcagc ctcccaatg tgaagaagtt cctgcagcct
300

ggcagtcaga gaaagcttcc cgtggatgca aaacaaatcg aagaagcang gaagatttc
360

aagttttagc ggagctgcac tgtccaattt ctttatgctt tgcanaaaat gagaagcaat
420

tgttgatcct a
431

<210> 131
<211> 180
<212> DNA
<213> Rattus norvegicus

<400> 131

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60

cttgcacaaa tcaaggacaa agcaaggaac cgttactttc ctgccttga aaaggtgttg
120

aagagccatg gacaagatta tctcggtggc aataggctga gcagggctga tgtttaccta
180

<210> 132
<211> 156
<212> DNA
<213> Rattus norvegicus

<400> 132

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60

gaagaaaactg cacaaccat ctcattcctg tcttatctt attgtattgg aagctttctt
120

taagttacca tatttttagag cgttgttagt gcccta
156

<210> 133
<211> 187
<212> DNA
<213> Rattus norvegicus

<400> 133

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60

gctctgcaac aatgaagtat tttgactaaa tgttgaccgt acttattggg agggtaacat
120

gttttctaag gcttctgtgt taattcatat agacatgact catgaggaat tgctggatg
180

ccatctca
187

<210> 134
<211> 295
<212> DNA
<213> Rattus norvegicus

<400> 134

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60

gttcctgtgg gaaaggtccc agatacacac tccagagcta actctgaaac gtcaagaaat
120

caaagccccag aatctcggtgtt aggcgaatgg agactcccca aaggacacga aacagctgtt
180

aaagttagcgg gcagtgtgtc cgagaagctg ccctccagca gcctgctcat ggacagagct
240

gaagcagcca gccttgcaca gtcggcaggc cacgaggact gggaaatgggt gtcta
295

<210> 135

<211> 93

<212> DNA

<213> Rattus norvegicus

<400> 135

gatcttggca agggaaatgg tcagcatcag cccttgcct cagcctgtgc tttgagtcct
60

tgtccccatc cctcacactt tccctccatg cta

93

<210> 136

<211> 156

<212> DNA

<213> Rattus norvegicus

<400> 136

gatcttgaga ggtgccctgg gatgaatgcc gtttacagtgt tgcatgtcct ttgaggtgt
60

ttggaaaagt gcagcgaatt ttaacgtatg tgatccgcca tgctgtgaaa acactattgg
120

gatacctccc ctgtgacggt attggagggtt tggcta

156

<210> 137

<211> 73

<212> DNA

<213> Rattus norvegicus

<400> 137

gatcttggc atcacatgac ctcttgcgggt ggtcacaggg agtaaaaatg tgcctgtc
60

ctgttgtcag cta

73

<210> 138
<211> 137
<212> DNA
<213> Rattus norvegicus

<400> 138

gatcttgaag ttttcatgtat tttaagagt cagaatcttt tgtatgtatt cacagtacgc
60

ttagaataag gtgatTTTG tttagccac agactcatgg gagtagatta gtgtaaGTTA
120

ggatgaacctt cacccta
137

<210> 139
<211> 125
<212> DNA
<213> Rattus norvegicus

<400> 139

gatccaggct ccagttgtca tggctgcttt gatgagccct ttcccgaaga cttgcttgag
60

tttgggctgg agttcaaagt tctgcagccc tccgtgcaca gagatgagaa gtttggaaag
120

ctcta
125

<210> 140
<211> 103
<212> DNA
<213> Rattus norvegicus

<400> 140

gatccatgga ggtgcactgg ttataggcat ggcttcattt tatgtatggct ccatgctggc
60

agccatggag aatgtatgtgg tggtcactat ccaataccgc cta
103

<210> 141
<211> 172
<212> DNA
<213> Rattus norvegicus

<400> 141

gatccaaacca caaacccaca gggtgacaca ctggatgtct ctttcctcta cctggagcct
60

gagaaaaaga aactggtggt ctcgcatttc cctgggaagg aacagcgctc ccctgagtgc
120

cggggcccg aaaagcaaag aaccccctga tgctccccgc tgagactcac ta
172

<210> 142

<211> 238

<212> DNA

<213> Rattus norvegicus

<400> 142

gatccgtgct ggccacaccc agagcaccaa ggatggggag ctcaggccat atggccaagc
60

atgtgtggat gacagcaaag gtcagaagct actgcctgcc cctctggttt agatggttgc
120

tcaggagccc agacttcgac tcatggtgtg ccagggaggg ctggggacaa cagggggtcc
180

cttcccaggc ccatctgctg ccccacactg atctgcctgt cttttctgct gctctcta
238

<210> 143

<211> 104

<212> DNA

<213> Rattus norvegicus

<400> 143

gatccgtatc tggctgttagc ttgcgtcctc agcaaacaga gcgcctatga aagcccaat
60

ggatgtccct ccgattatgt ccacggggat gccacattct gcta
104

<210> 144

<211> 178

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 144

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60

gtacggcatg cctgtcaccc tcatacgaga agctgtcttt gtcggtgct tgtcttcct
120

gaaggaggag cgagttcagg ccagcagana gctgaaggc cccaagatgg tccagcta
178

<210> 145

<211> 157

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 145

gatcctaaag cgcaaagtca tagagaaagc gcaacagatt caggttctgc agaaagacgt
60

cgggatcatcg ctgatagaca tgaagcgct gnaggttaagc ctgaggcnnc ggccccaaatt
120

tgtctttgac taagaaaaaa ggaatangaa cactcta

157

<210> 146

<211> 207

<212> DNA

<213> Rattus norvegicus

<400> 146

gatcctccgg gttatagatc aagagcttca tggggtagg atggcatcct gccaaaatat
60

ctccggtgcc tggatcaaca gtcaggttat ccactaaggt gcccagctga attacctca
120

ctggagttaa atcccaatta ttgtgtttt tcattatgtg aatgttctta gctgttacat
180

cagctacata gacatacttc tggtcta

207

<210> 147

<211> 453

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 147

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60

tacaaaaggc tacgtctccc ttctcaacga ggcactggaa agcccctgta taaccattat
120

atccctctct gttgttcgga gcacatttg ctgggccaat acacaggta cagagggtgg
180

aattttctt atagccagga gcacagcctt gactgaaaaa ttcatcgAAC ttgcagtgg
240

tgatcctgct gaacagcagg cccatagggta tgttccagcc ggccggttctg tctactccag
300

tatggcagga cttcttgcc ttcaagggtgt tccagttgtat gctggagtct gatgccttca
360

ccacagccac ggcataatac cctttaggaa agacatctga ttgtgggttt gtacacgaag
420

agatatcata gttctctgcc atgacnggca cta
453

<210> 148

<211> 140

<212> DNA

<213> Rattus norvegicus

<400> 148

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caagaaatgc ttaatgggtt cctgtattct ttcttcctgg attactcagt gctgagtgaa
120

gacttctcac caggactcta

140

<210> 149

<211> 258

<212> DNA

<213> Rattus norvegicus

<400> 149

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60

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120

cgggatgcgg atgatctgca gaagcgcctg gcggtgtaca aggccggggc acaggagggc
180

gccgagcgcg gtgtgagtgc tatccgttag cgccctggggc cactggtgga gcagggtcgt
240

cagcgcacag ccaaccta
258

<210> 150

<211> 98

<212> DNA

<213> Rattus norvegicus

<400> 150

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60

cctaattgaga agggctctgt cagcatggac ctggacta
98

<210> 151

<211> 64

<212> DNA

<213> Rattus norvegicus

<400> 151

gatctagatg acacggagga gccccaggac cttccctgag gtgatttcac ccttggtgcc
60

acta

64

<210> 152

<211> 136

<212> DNA

<213> Rattus norvegicus

<400> 152

gatctccaca tcagtaactac aatggctatg agaaaggcct gcaagcttcc tccatggaca
60

aacacctggg ccacggcttc gctccgcagg tagatatttt cgatcttttc tggagctatg
120

tactctcctt gggcta
136

<210> 153
<211> 132
<212> DNA
<213> Rattus norvegicus

<400> 153

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60

catctgagca gaggggcctg gcactccagg caggcgagcg atgctcaagc ttgttaccag
120

tctggtctcc ta
132

<210> 154
<211> 218
<212> DNA
<213> Rattus norvegicus

<400> 154

gatctccacc gaactggta agagcaagct cagggagacc actggggcag cctgcaaata
60

tggggtaagc aactacatgt gtattccag tccotgtcta aagatagaga cgtcatgttg
120

ccatagctgc tcacgctcct gtgagctgcc ttctccccat cctaagtccct cctcagcttt
180

cctaaacacc tcatccactc ctttcctccc taaggcta
218

<210> 155
<211> 124
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 155

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60

tactggcttc gttcagaatg aaaattgctc tcagcagncc tcattgatat ttgtgcctcc
120

acta
124

<210> 156
<211> 218
<212> DNA
<213> Rattus norvegicus

<400> 156

gatctcccc agcagcagct ccaccacaat cagaagcttg tgcaccgtct gtttgaagcc
60

aactgctgtg tgctgtggtg ccttcgaag ggcattggtc atcgttctcc gggcttcaga
120

gtactccagt tggatagcct tgattcgccc tgtgttagtag aggtacctgg cccactcatt
180

gttggtagcc tgttcgggaa acacagactt ggacacta
218

<210> 157
<211> 43
<212> DNA
<213> Rattus norvegicus

<400> 157

gatctcattt taacccgtaa ccagtctata tgtgtttgga cta
43

<210> 158
<211> 357
<212> DNA
<213> Rattus norvegicus

<400> 158

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60

gagttcgcca cctgccacct ggcctaagct ccaaaccatg ttgtggtctc acgaaaagag
120

aaggcagccc gggtagcac tgtgctgact gcccagaagg atttattttg gaaaggtagac
180

aaggactgca ctggcaattt ctgtttgttc cggtttcca ccaaggacct tctgttcaga
240

gatgacacca agtgttgac taaacttcca gaaggtagca catatgaaga gtacttagga
300

gcagagtaact tgcaagctgt tggaaacata aggaagtgtt caacctcacf actccta
357

<210> 159
<211> 47
<212> DNA
<213> Rattus norvegicus

<400> 159

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47

<210> 160
<211> 113
<212> DNA
<213> Rattus norvegicus

<400> 160

gatcttatca caccagccag caaagtaccg gaaggtagtgg atggacatgc ccacgtgcgt
60

cttcagggcc agcggtttaga cggcacctgc atccagggcc tcaatggtgg cta
113

<210> 161
<211> 163
<212> DNA
<213> Rattus norvegicus

<400> 161

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60

gaaggacagt gctgccacca ctgatgagga gcggcagcac ctacaggagg ttggtcttct
120

ccacctgggc gagttgtca atgtgttctg ccatggctcc cta
163

<210> 162
<211> 180
<212> DNA
<213> Rattus norvegicus

<400> 162

gatcttggtg accatgctac cctgaagagg tccccaggag attgcaagag tgccccaact
60

acagaggaga ctcgcaggct gtctcaggcc atgatggctt ttactactga cctgttctcc
120

ctggtggccc aaacatccac cagctccaac cttgtcctgt caccccttag tgtggcccta
180

<210> 163

<211> 179

<212> DNA

<213> Rattus norvegicus

<400> 163

gatcttaact gcagattcta cacatttctc atcctcta at ggttcctct ggctgccagg
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ctgaagaaac ttcttcactg tggggaggtt gctgactctg gttctcaggg cttcagcag
120

aggaaagtgc gccaaagcgc tgggtccag ctctccaca tggtagagaa cttgaacta
179

<210> 164

<211> 217

<212> DNA

<213> Rattus norvegicus

<400> 164

aattcacagc tgaggaatgc taaatggctg agaagcacct aaagaaatgt tcaacat tttt
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tagtcataag ggaaatgcaa atcaaaacaa ccctgagatt ctacctcaca ccagtcagaa
120

tggctaagat caaaaactca ggtgacagca aatgctggaa aggatgtgga gaaagaggaa
180

cactcctcca ttttggtgg gattacagaa tgg tttt
217

<210> 165

<211> 197

<212> DNA

<213> Rattus norvegicus

<400> 165

aattcacaga gacggctgcc atatttgaag atggctccag ggaggatgac attgatgtgg
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tcatcttgc cacaggctac agctttgcct ttcctttct tgaggactct gtcaaagttag
120

tccaaaacaa ggtctccttg tataaaaagg tctttcccc taacctggaa aaacccaactc
180

ttgcaatcat cggtta

197

<210> 166

<211> 419

<212> DNA

<213> Rattus norvegicus

<400> 166

aattcagtt acatcttgtt cacagccat ctctctcctc ttccttagtc ccatccttgc
60

cagatccctg tcccaattgc cccctccact tgggtaccac ctaaccctgg gacatctgct
120

tcatgttagta ctagctatat cctttctcac tgaggcctaa ccaggcagtc ttggtaagga
180

tgagatccaa tgcttaggaac tatagactga gacaacccca gttctgttgg gagcagctaa
240

agatggcacg acatccagtg gtctttgtg gtatacaacc ataacatggg tatatagcca
300

tgtccctggc cttttctgg catttacaag gccagggtga taagcatgtc aataaggtat
360

ctcacacccc accaattcctc agaaggacaa gtttacagcc actgcctgtt ttgtactta
419

<210> 167

<211> 159

<212> DNA

<213> Rattus norvegicus

<400> 167

aattcagtct tatcaatgaa ggtcagagcc attggaaag gtgaagtggg ggagccctgt
60

catcgatccc aactgggtcg gaaccctccc acgcatgact caattcagag ctgtttccca
120

ggaggctggg gcgggatgca gacagattcc aacaccta
159

<210> 168
<211> 110
<212> DNA
<213> Rattus norvegicus

<400> 168

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60

aacctttaga ataatgggtt ttgttggttg aagaagtctt tgcgtgcctta
110

<210> 169
<211> 199
<212> DNA
<213> Rattus norvegicus

<400> 169

aattcattgt aaatggactc ctcaacaaaa agtctggatg ctgcgcacaca aatctgaccc
60

tggtggaaaga atactccttg gtgtgcaaac tcatcagcac tatccaagtc agcatctgca
120

aacacaatgc aagggtctt tcccccaagc tccagggtga ccctttcag attgctttc
180

cctgcagctt ctgtgatta
199

<210> 170
<211> 380
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 170

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gagacccacc ttccttccct tctccctgaa cagcagtctg gcacccagaa gctcagagtg
120

ccaccacctg tggtgctcag gagcccagcc tagaaagagg actccgacac agcgggcagn
180

ggctccacag acggatctat gaggaaaata cggggcagg cangcaggca ggcgacccccc
240

tgaccctctg gtggccgctg tatctgagcc cttttggaa ggcttataga caacaggtgg
300

agccccatacg ctgggcatacg ggagcctggg aagggctcag gagctcagga ccactccagg
360

ctctctagca ccaccgctta
380

<210> 171

<211> 366

<212> DNA

<213> Rattus norvegicus

<400> 171

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60

tttgcagcaa gtactcggtt cgaggctacc ccacattgct gctttccgg gggaggttag
120

aaagtgggtg agcacaatgg aggcagagac ctcgactctc tacacagctt tgttctgcgc
180

caggcaaagg atgaactcta agaaccctgg tgaagccgtc atccaccctg gccttatgca
240

ccccgtgcat aggagtgacc tcacatggac atgcgtatct tcactgtgg tagtcagaac
300

gctgaatgta ttgagcttgtt gttgcttgct gtgtgccctt tgagccacca cacactacgg
360

acctta

366

<210> 172

<211> 339

<212> DNA

<213> Rattus norvegicus

<400> 172

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60

agatatggaa gcagctacag ggcaggaggt cgagctatgt tttagaatgca tcgaatgggc
120

caaattcagag aaaagaacct tcttacgccaa agcattggag gcaaggctgg tgtctttgt
180

ttttgataacc aagaggtccc aggaagcatt acatttgggt tctcagctgc ttccggagtt
240

aaaaaaagatg gatgataaaag ctcttttgtt gaagtacagc ttttagaaag caaaaacttac
300

catgctctga gtaatctgcc gaaagccccga gctgcctta
339

<210> 173

<211> 290

<212> DNA

<213> Rattus norvegicus

<400> 173

aattccaaga gttcgaggtg gtggcaccca cggctctggc cagggtgcct ttggaaacat
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gtgtcggtgaa ggccgcatgt ttgcaccaac caaaaacctgg cgtcggtggc atcgagact
120

gaacacaact cagaaacgtat atgccatctg ttctgcctcg gctgcctcg ccttaccagc
180

tttggtgatg tctaaaggta atcggtttga ggaagttcct gaactgcctt tgggtgttga
240

agataaaagtt gaaagttata agaagaccaa ggaggctgtt cagctgcctta
290

<210> 174

<211> 199

<212> DNA

<213> Rattus norvegicus

<400> 174

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gacttgactc caccggagct tccaccccttgg ccggggactgc tctaccctgt gaggccaaaca
120

cttttaggtgt aagttaggtac actttgtgtat gtcactgacc tagtgtaccc tttctttttt
180

catatatata ctgacacctta
199

<210> 175
<211> 165
<212> DNA
<213> Rattus norvegicus

<400> 175

aattcccagc aacagataca atgaggggct gcgcgtgagct cttcctgcc aagaacgacc
60

atcttctcac ggcatccctc atctcacaag tgtccaggac catggggaca ttgcattcaa
120

agcaccgtac ctgctttcta attgatggtc aaggttatat gctta
165

<210> 176
<211> 46
<212> DNA
<213> Rattus norvegicus

<400> 176

aattccagca ataagaaatg aacaaagatt ggagctgaag acctta
46

<210> 177
<211> 39
<212> DNA
<213> Rattus norvegicus

<400> 177

aattccgaat gtggattgtg attttcctgc ttccactta
39

<210> 178
<211> 283
<212> DNA
<213> Rattus norvegicus

<400> 178

aattccaccc aaggctgctg ggtctgactg gttctacaga acaagtggcc catgctagtc
60

gcaactaccg tgtatactac agcgctggc ccaaggacga ggaccaggac tatattgtgg
120

accattccat tgccatctac ttgctcaacc cagatggct cttcaactgat tactatggc
180

gtagcaggc agcagagcag atcgttagaga gtgtactgcc ggcacatacg tgccttccat
240

agcatactgc cctgaactgt gtactgccta ggccctgtca tta
283

<210> 179

<211> 223

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 179

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cactcggctg tacaagtggc tccccagaa tgacnttctt ggtcatccna aaaaccnaaa
120

gctttttagt ctcatggc aacaaatggc atctatgagg caatctacca tggcattcct
180

attgttggtt ttcccttgg tgcagatcaa ccggataaca tta
223

<210> 180

<211> 182

<212> DNA

<213> Rattus norvegicus

<400> 180

aattccctgg ctttctgggt ctagagtgtt ctgtgcctcc aaggactgtc tagcgatgac
60

ttgtattggc caccaactgt agatgtatat acgggtgcct tctgatgcta agactccaga
120

cctttcttgg ttttgcttgc tttttctgat tttataccaa ctgtgtggac taagatgcat
180

ta
182

<210> 181
<211> 189
<212> DNA
<213> Rattus norvegicus

<400> 181

aattcctcat tggtcatgtc accgaaggcg ttcatctcca tggtaaagcc gtgctcccc
60

ttgctgtact ccccattgtg tagctggatc atcctcatgt tcttctccca cactgctctc
120

ctccactctt cctcattcgt gccatacagt cttctgtgtg tggacttcca ctggtgccac
180

tgtgcatta
189

<210> 182
<211> 160
<212> DNA
<213> Rattus norvegicus

<400> 182

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60

agtgacagct agtgtgtgcg cgcgctctct cgctctctct ctttctccct ctctctctcc
120

ctattccctc ccctcctctc ctctgccct tcctggttta
160

<210> 183
<211> 287
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 183

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60

agtttcctac tattacttgc tgaggtttg agatgattac agnccggac taaggaggcg
120

gacacaagga gacaagaaga cttcgatga atgcgtggct gaggcggctc agactgtgct
180

ccagagaagc tctggcttca gatcccgttc ttctgtggcc actagctcag aatgctggaa
240

tgttggaaagc agatgggcga tggatcaagc taagtacanc ctggtta
287

<210> 184

<211> 135

<212> DNA

<213> Rattus norvegicus

<400> 184

aattcgtcaa agcagcacca ggccccgac tgtgccaaac cactgaagaa gcgc(ccatc
60

atctgaaagg caagcaaagc tgatcaactt caggctgcct tgggtgtcat ctctaaccatt
120

cataatctag agtta

135

<210> 185

<211> 79

<212> DNA

<213> Rattus norvegicus

<400> 185

aattcgcacag tgtccatgc agacattact aattgattct gttcttatta tggAACCTT
60

tggctggcca ggtgtgtta

79

<210> 186

<211> 413

<212> DNA

<213> Rattus norvegicus

<400> 186

aattcgttagg aagcttcaaa accaaacaag acttcataga tttgattgaa gtcatctacc
60

ggggagctat gcgaggaaaa cttattgttc aaagtccatat tgaccccaag aacataccca
120

aatacgacct cctcttatcaa gacattttagc actcgctgct gttggagaga agagaggcac
180

aggctgaagc agaacctgaa ctcagagagc ctgtggtctg gagtcctca gagacatgct
240

cactgcctga gcaaagaggt ttcatalogtc tgtaatcaac ggcccctctg cagaagcccc
300

agtgcctcca gaatggagat gcctgagcgc ccattctctg agagcctcag agcagtgagc
360

gagtgacagg tggcattgta acggaccctt tatcttgact gtcttcccc tta
413

<210> 187

<211> 362

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 187

aattcgggca gggcatcatg gtccataaaac atgagggat gaaggtctt gtgccactg
60

gcttttcagc cttcccttcc gagctactgc atgccccaga aaagtgggtg aaggtaagt
120

ccccaaactc atctcctatt cctacatgga acgtgggggc cncttgctg cctttgaaga
180

gcccaagctt ctggcccagg acatccgcaa gttcggttcc ctggctgagc tgcatgt
240

acactggata ccaactgtgg cttagcagc agccctggtt cctcccaagt cacacttatg
300

gaagatgacc ccttctnag gaataagttt gttccctgac cacactcgag gaccagact
360

ta

362

<210> 188

<211> 74

<212> DNA

<213> Rattus norvegicus

<400> 188

aattcggggc tgttttagat ttcctacact ctgattggta ggtgtgtcca tctggacagt
60

ttattcttagc ctta

74

<210> 189

<211> 267

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 189

aattcggggg gccgttgggc ttcacggcga tgctgatcct gctgcctgcc accatgttcc
60

acctgcttct ggccggccgc tcgggtccgg cgccgcctcct ggccctacca gcctatctgc
120

ctgggctgga ggagctgtgg agcccacggg ctctgctgct gttgttcatc tggctcgcc
180

tgcagggtggc gctctatttg ctgcctgcac gcaagggtggc cgaggggctg ganctgaagg
240

acaagagtcg cctgcgtac cctatta

267

<210> 190

<211> 192

<212> DNA

<213> Rattus norvegicus

<400> 190

aattctaaac atatgccatt gtggaagaag caaagccacg gagatagcag gccagtgcag
60

attcactgat gtgacaactg cattctctca ggtaggaca ttgggtggaaag gagcctctgc
120

acttatgggc tgtgttagcta tggaaacctt gtacttcctg ccaattttgc tctgaaactc
180

aaactgcctt ta

192

<210> 191

<211> 83
<212> DNA
<213> Rattus norvegicus

<400> 191

aattcttagat ttcttggtaa actatcaa at ctgtatatgt atgtaataaa gtgtcta atg
60

ctaggagttt attggaaggt tta
83

<210> 192
<211> 56
<212> DNA
<213> Rattus norvegicus

<400> 192

aattctcaga aactatataa tacattctgc tggtggccaa tgcaaagtgt acttta
56

<210> 193
<211> 42
<212> DNA
<213> Rattus norvegicus

<400> 193

aattcttcag aaatgtggtg tctaagaaca ccagaccctt ta
42

<210> 194
<211> 133
<212> DNA
<213> Rattus norvegicus

<400> 194

aattctatgc attgatttac atgtactgaa ccatacttct ttgactgtaa tggagccaac
60

ttgtggtaaa tggttat tttt catatgttct tgacttgata tgaaatattt tactataaac
120

ttttcatatg tta
133

<210> 195
<211> 79

<212> DNA
<213> Rattus norvegicus

<400> 195

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60

atgtatTTAT gccatgtta

79

<210> 196

<211> 65

<212> DNA

<213> Rattus norvegicus

<400> 196

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60

tgtta

65

<210> 197

<211> 64

<212> DNA

<213> Rattus norvegicus

<400> 197

aattcttcag aaggtagtg aagctatTTG catatgtaaa taaactgcta agattgtcat
60

gtta

64

<210> 198

<211> 41

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 198

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41

<210> 199

<211> 36

<212> DNA
<213> Rattus norvegicus

<400> 199

aattctgcaa attgccttac agactagcca tactta
36

<210> 200

<211> 218

<212> DNA

<213> Rattus norvegicus

<400> 200

aattctctac catctgttac aggctgtggg atgtcagagg aaggaacggg gtttggtgg
60

ggtacccagg gcaggaccga gcagcaggat tcccgcaaga gaaaggaggg agatgggcct
120

tcaagagct ttaggaagcg actaacagca gagtgtctgg gaacatacga atcagtctct
180

tgcataattgt aataaaaccaa acacaagact cgccatta
218

<210> 201

<211> 151

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 201

aattcagcct gaggagaaaa tcagtctatg gtntacttcg tcctgcctct tagttctgt
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acctgcttgt cacatttgca cctatgagtc aagacatgtt tgttaccttt attttgattt
120

atttctattn caattcaatt ttttccttt a
151

<210> 202

<211> 63

<212> DNA

<213> Rattus norvegicus

<400> 202

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60

tta
63

<210> 203
<211> 221
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 203

aattcctttt atcaactgca tacaaagtgt nttaataaca attttttccg tataaaaata
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120

gggacagtga gtcctgtggg gtgttggac acagccacag gacaggcctc ctgacagtgc
180

tgcagatcag acggcaaaag aaagcagaac tgtctggttt a
221

<210> 204
<211> 178
<212> DNA
<213> Rattus norvegicus

<400> 204

aattcctcca tcattgcaga ccggattgca ctcaagctgg ttggccctga gggctttgt
60

gtgacagaag caggattcg agcagacata ggaatggaaa agttcttcaa catcaagtgc
120

cggtattctg gtctccagcc tcatgtggtg gttcttggcc ccactgtcag ggctctta
178

<210> 205
<211> 233
<212> DNA
<213> Rattus norvegicus

<400> 205

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60

cgaagacacc aagttcaacc accgtccatc cagaaatgag aagaacaata ccctagagca
120

aagtcatcca cacccagtac acactccgct gctaacctga aatgcataaa cagaaaccca
180

tagtatttat gccctcttag gcaggtgtcc acaataaaa tgtgagcagc tta
233

<210> 206

<211> 74

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 206

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60

gactcattac ttta

74

<210> 207

<211> 54

<212> DNA

<213> Rattus norvegicus

<400> 207

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54

<210> 208

<211> 240

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 208

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tcaaactctt ctaacattgc aatatgctaa tattgttaga ctgctacaga tgcactgaaa
120

cacagaatat gatctttaa gggccaaaa atgctacggt gtgaaaatat cacaatgact
180

gtcttncct taaaaaagtc acataaaatg cagtttagaa caaggngaaa cataggtcta
240

<210> 209
<211> 147
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 209

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ttnatgttct ttatgaaaaa ttaaaaacct cccctccac aacttcctc ttgcggaa
120

tataggtaag atcataacat ctatcta
147

<210> 210
<211> 67
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 210

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60

tactcta
67

<210> 211
<211> 41
<212> DNA
<213> Rattus norvegicus

<400> 211

aattcattct gttttttaa tctaactttt atatcaatct a
41

<210> 212
<211> 99
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations

<400> 212

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60

gggactaata gtgatgtaat ggnaccatg ccctgccta
99

<210> 213

<211> 141

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 213

aattccatgt ctatggnttc caagtcngna gagaancacn nggatgactg ccaggaggac
60

ccaggtttcc agtgtgagag ctgaaancag gtccatccct gcttgtctgt cancaaatta
120

ctcctcggtg ttctccctct a
141

<210> 214

<211> 134

<212> DNA

<213> Rattus norvegicus

<400> 214

aattcctcca ccatthaatt cagctccaat caatttcaa tattgtctac actgtccct
60

gcaaaccat acccatthaag atttatgact attcctccta ccctgtttcg cttgctgtgc
120

cacgtgctaa tcta

134

<210> 215

<211> 121

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 215

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60

agaaaaagtga ctatttcatg cctttctca gaggaaaacg gatgttncag ganagggtct
120

a
121

<210> 216
<211> 254
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 216

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60

aagagatgga aaaaaacaaa caaaccatcc tgaagtcagc ttctccatgt actgtcacaa
120

ttagagactc aattgcctcg tgagtgtggt ggagggagga aaaagggttc atacctgcct
180

cattaggaag agcagaacta tggtaagan cacagtggac tggatgttac actcantnnm
240

ccacttaata gcta
254

<210> 217
<211> 107
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 217

aattccgnnc cgaacaaggc cacangtgan ntctactgga ntccatgctg ccatttttt
60

gtctgaaaat gtcagtactt aaaagtattt agnnaacact cgagcta
107

<210> 218
<211> 37
<212> DNA
<213> Rattus norvegicus

<400> 218

aattccttgg tattcggtat cagtaggaat ggggcta
37

<210> 219
<211> 291
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 219

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60

anaagaaggta gagactgtcc aagcccttgg taagccacat gcggctccgg tgtcacagcc
120

tgccacgtgg tcctgggggc cttcctctgt ggcaaaccgg atgtgcctgt ctacgatggc
180

tcctgggtgg agtggtacat gcgtgcccaa ccggagcacg tcatntntca gggccgggggg
240

aagaccctgt gaangacaca gtgcagcttg ggtgacacccg gaaccatcct a
291

<210> 220
<211> 289
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 220

aattcctgaa aaaagacata tcagaggaan ttcttaataa aatcatctac cacacctcct
60

ttgatgtaat gaaggaaaac ccaatggcca actataaccac tctaccctcc agtatcatgg
120

accactctat atctcctttc atgaggaaag ggatgcctgg agactggaa aactacttta
180

ctgtggcaca aagtgaggat tttgatgaag actaccggag gaagatggca gggagcaata
240

ttaccttccg cacagagatc tgagagcagt gaggnagagg ganncccta
289

<210> 221
<211> 91

<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 221

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60

gatttagcta cantgnnana gcacttgct a
91

<210> 222
<211> 166
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 222

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60

gagtccagag gcctccgact ccacagagan cagctcagtn ttctgtcttta ctgcgctaca
120

cgtagaaagag ctaagaaatg gagccggtn ncagaccccn ggacta
166

<210> 223
<211> 112
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 223

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60

gntccggatt gacagtgacc acacagccca tganganccc acaggaccac ta
112

<210> 224
<211> 65
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 224

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60

gtcta
65

<210> 225
<211> 44
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 225

aattcgccaa gagcgttga ntgacagctc tttgttatg tcta
44

<210> 226
<211> 105
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 226

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60

cctctgtttg ccatcacnga cacagaaatg ancaagaatg tgcta
105

<210> 227
<211> 110
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 227

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60

aaagaaaagca aaagggttgg gattnagntc agtgggnagag cgcttgcccta
110

<210> 228
<211> 392
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 228

aattcgggag tgnggnncct tctgantctt gcancaaaga ggctnttcta tagcatgnnc
60

nangatgctg gcttggtgtg aacnnatctc tggcatatct gatgangatg cangnccagg
120

atcccantgt ccangnatga nccagcaacc ctggaaacct acactcccc gaaaaaaacc
180

anaaattgaa agaanancaa actaaaagga ngcnaaacac ataaagcatc antcacagtt
240

tgnnccagcc tngatctgac ntcgaanaag cctgaagaca gatgtgcccc ncttcanaca
300

cgtctggctt ctggcaccac ttgtgagctn cctgaaagtc accannctcn tgctgtntcc
360

caanncaang nnatgagnnc ccnaacacac ta
392

<210> 229
<211> 81
<212> DNA
<213> Rattus norvegicus

<400> 229

aattcggaaag gactctccaa tgtcgttcag ggagatatacg ccgctttcta tctaagaaca
60

tcattacttt aacaagtact a
81

<210> 230
<211> 203
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 230

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60

acacagagct ataatgtcct gtgtcaagaa aactgtgttag acttgangta cagggttct
120

gaaggcctcta aagtctacac ttgaatggat atatcacatc tgttggatga ccctgcaatt
180

aagggttgaag tcgaccatgt cta
203

<210> 231
<211> 110
<212> DNA
<213> Rattus norvegicus

<400> 231

aattctgctc tgtgtatcct gatccaccaa gcagtcactt ggttagcagaa aagtggtctt
60

atgtctgctc ttaactgtgg tggcgcttct gggactgtct tccagctcta
110

<210> 232
<211> 252
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 232

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60

aagaangtta gagcacagta catactaccc ctgccctgct cccaccaccc gctctccaca
120

accctccccc atgtgcaact gacactcctc cccagtcgat gtcctacct accttcagc
180

ccacgtcatt cgtagtgccc atcttgtttaa gccctgttgt gccacacagt ntaacnngcc
240

cccctgcagc ta
252

<210> 233
<211> 120
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 233

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60

gggaggccag tttccatccg cactgaattg gggagaanaa aactggnccc aattacgcta
120

<210> 234
<211> 47
<212> DNA
<213> Rattus norvegicus

<400> 234

aattctaagc cgagtttaac atgttcaaga tatctccgtt tcagcta
47

<210> 235
<211> 121
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 235

aattctccga cccggnnata tttgaccctg gccactttt agatggaat ggaaagtta
60

agaaaaagtga ctatttcatg ctttcttag cagaaaaacg gatgtgtncg ggagaggcct
120

a
121

<210> 236
<211> 65
<212> DNA
<213> Rattus norvegicus

<400> 236

aattcatcca caccaactgg acatgccac ggtggcagtg tgtcgctctc ttcatacaat
60

gccta
65

<210> 237
<211> 49
<212> DNA
<213> Rattus norvegicus

<400> 237

aattccctac acagaccaga actggctttt aactctacca ctacgtcta
49

<210> 238

<211> 48

<212> DNA

<213> Rattus norvegicus

<400> 238

aattccctgg gtgcctttct ttacaaaatg ggttcaataa ataagcta
48

<210> 239

<211> 74

<212> DNA

<213> Rattus norvegicus

<400> 239

aattccatat gtaataggat gcaagtctaa gcgtttcatg tggacataaa tgtatctaaa
60

taaaaacttcc ccta

74

<210> 240

<211> 142

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 240

aattccaggc tggnnttgcc tttctctgct ttcatgacct cttgacccca acgagctgat
60

gttaggacca caacactggt aggtggtaa aaaacaagca acaaggcgtg gggattttagc
120

tcagtggtag agcgcttacc ta

142

<210> 241

<211> 184

<212> DNA

<213> Rattus norvegicus

<400> 241
aattccaaga gtgacttgct ccctccccct tctccaccga aaaccaccca aagtggaaa
60
tgaatctctt caccagcacc cctctggcca caggcaaagt atgccacagg cctctgacat
120
actttggaca gactgccagc taacacccac cacccccattt ttaagacaca tctctggatc
180
ccta
184

<210> 242
<211> 71
<212> DNA
<213> Rattus norvegicus
<400> 242
aattcccaag gtcaaattgcgtttagctgctgtggacttcg atatggaaca tgttacctct
60
ccctttgcct a
71

<210> 243
<211> 391
<212> DNA
<213> Rattus norvegicus
<400> 243
aattccccata cacattggat taatcttact aacatgacaa aaaattgctc cactatcaat
60
tctataccaa ttttatcaac tccttaagccc aactatcacc accattctcg caatttcata
120
agtctttgtt ggccgcctgag gaggacttaa ccagacccaa acacgaaaaa tcatacgata
180
ttcatcaatt gcccacatag gatgaataac agcaatcctt ccataacaacc ctaacttaac
240
cctcctaaac ttaacaattt acatcctact tactgttcca atattcatca cactcataaac
300
aaactcagca acaacaatca acacactctc actcgcatga aataaaaactc ccataatcct
360

aaccatagca tccatcatcc tcctatcact a
391

<210> 244
<211> 175
<212> DNA
<213> Rattus norvegicus

<400> 244

aattcgccct gtcgggatga gagagtggga gactgagtaa ccatggctcc gccgtgccct
60

cactggctct tttccgtgta gcatctctgg gcaagtgagg gaggcatatt agtttccatt
120

tgcaggtgtg gaacactgag ccccagaaag gacaagaaga ctcattcagt agcta
175

<210> 245
<211> 194
<212> DNA
<213> Rattus norvegicus

<400> 245

aattcgccaa ggatgactcc gatagcatga gccgaagaca gacttcttat tctaacaacc
60

ggagcccaac gaacagcact gggatgtgga aggactcgcc caaatcttcc aaatccatca
120

gattcattcc tgtctccact tgagccccac gttcacgcag cccgactctt gggagggact
180

tttgtgtcca gcta
194

<210> 246
<211> 44
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 246

aattcgggct ggggatttag ctcagtggan aaacgcttgg ccta
44

<210> 247
<211> 198
<212> DNA
<213> Rattus norvegicus

<400> 247

aattctggag atggcacacg aggatcagtt caaggtcatc ctttagctact cactgcata
60

taagttttag gtcgtcgtgt gctacatgag accgagggag agaaaggagg ggaaggagtc
120

aagcggtagt tgccttaat cgcatcattt gggaggcaga ggcaggtgga tctctcggtt
180

tgaggccagc ctggtcta
198

<210> 248
<211> 332
<212> DNA
<213> Rattus norvegicus

<400> 248

gatccgccccac tccttctgca tacatgtcga tgagggctct ctccttcatg tccttccat
60

agaggttgta tttggggca atgtagttga gaatggctct ggtctgcacc agcttcatcc
120

catcaatctc caccatgggc acttgctgga acatcaaact cccatcatc cttggctgg
180

ccaggtcatc ccgagtttc agaaattgtt cttcaaaactc tactccagct gcagccagga
240

gccaccggat gggctccatt ctccccctgc catcgaagta gtgaaggact ggcttccccg
300

gcatggcagc aattgcttga gttctttgt ta
332

<210> 249
<211> 481
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 249

gatcctgggt gttcgacca cagtcctggg tcactggccc agaggagccg tggtatcaag
60

gcacaaagtg aggaagtggt cctgggaggg gcgggggcgg ggcagctccg agctcaggca
120

gtagggcact catggtagcca tgagggtgcc cagtctgcag gaggcatgga gtgaaggcca
180

gtgctggctc cacttggaa gaaaggcctt acagagcccc ggagtccgag gcagttggtc
240

tctgccancc atggcgtatc caagcctcct atccattccc cctgtaccc tggagatagc
300

ctgtccataa gatggctgtc ctgcctact gggccactt gaagaacaaa atgtcatttt
360

attctcttga gaaaagaaaa agaggaaatc attttgccc ctgcttggat gcctagaagt
420

ctaataagcc tcattacaaa aagacgtttt ctgcgtctca tctggcggtt tcttggctt
480

a
481

<210> 250
<211> 441
<212> DNA
<213> Rattus norvegicus

<400> 250

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60

accatcgact tccgtaggct ttcagcaac ttgaaattgt tcttgatctt caggttgggt
120

gaccaccatg tgcgtgagag gagtgacaaa attgtacttg agtgacaagt tcagaacttg
180

ggcctcgagg gcctctaact cagtcctga ggctgaaatc ctctgctcca gctgttgctg
240

tatggtcagc aacccccaga gtctctccat aaagttatga aagatgtact taggaccctg
300

gaactcttc tcttgggg ctatgctggc ctccgtttgg aaagtgtatgt tctgcagggtg
360

catctgccca ctgactttgg ctaagaggac atcagggccc tggtcccgga cttcccagcc
420

accaccatct ctgagccctt a
441

<210> 251
<211> 193
<212> DNA
<213> Rattus norvegicus

<400> 251

gatccacaca accaaaccaa catgagtgaa agagtttagca acacggcctg tggttcgct
60

atgtttgggt gtcttgagc aaagctgcta tggagaaaatg tgcaggtgcc tagggatgc
120

tgtactgctc tagaggatgt aactcaactc acagggtgac tttttgatgc ctgacccaat
180

tactagttga tta
193

<210> 252
<211> 156
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 252

gatcctggga ggatgttgac cacacccttg ggaatgccag ctttcagtgt cagctcgca
60

aacttcaagg ntgtgagtgg ggtcacctgg gcaggcttga tcaccacggt gttcccagcc
120

gccaggcagg ctgcatcttc caggatacca tcatta
156

<210> 253
<211> 101
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 253

gatccgaacc caagaggtaa aaaccttccc gcgcgaccag aagtgtccga ggctttcccg
60

gaggcggtgg gacttacttt cccaagaana aagcaggatt a
101

<210> 254
<211> 228
<212> DNA
<213> Rattus norvegicus

<400> 254

gatctgcacc gttttgaagg aggaattcta ccacagctat ttgcccgtgt gccgcagccc
60

acatcagggg agtaaatcct tttcatccg tgtgattgt aacattttct tttcaatac
120

gagtagccag gtagagcatc ttccttgag ctgccaactg gtgaacagac agagaatttg
180

ctaacagagg tgtggtgag acctcgttc ccctgtgctt gttggta
228

<210> 255
<211> 177
<212> DNA
<213> Rattus norvegicus

<400> 255

gatcttacg tggggctct ttaggttagt gactttatt tactcccaag ggcattcattt
60

caaactctcc ccctcttggt gaaagttcag attccacagc aggtgctgat agtacaacca
120

tgtccatttc ataacaatat gtaggatgtt tgatctcaa gttggtaat gctgtta
177

<210> 256
<211> 447
<212> DNA
<213> Rattus norvegicus

<400> 256

gatcttgggg tgtggtagg gattccagg gtgaaggttag attatttatt agggtggaa
60

tgttcattt acatgaagag gaatatgcc a agaacctgct ggacaaggta atatcctgaa
120

agaggaagtt gaatctgtaa tctggccata agttatgtga ctttcctcag aggatttctg
180

gggttacagg caggagtggc tgattggtca taacagtacc taattatcat atggtggaa
240

ggactgagtg ggatgtatgt gctgaacctt gtggcacttg caggaagctt tgtgcaaggc
300

cattctctag ataaggttag gcacttgtgc ttagaacact ttccagataa gattggcaa
360

aggagagggaa accccactga gaaagggagt cttccatttt gcaccaggta cagagagctt
420

atctagacat ggtcgacttc aaccta

447

<210> 257

<211> 350

<212> DNA

<213> Rattus norvegicus

<400> 257

gatctaaaat acctcggaa tacatgtcaa tcagggctct ctccttcatg tccttccat
60

agaggtcata tttgggtggcg atgttagttga gaatggctct ggtctgtgcc agttcatcc
120

cgtcaatctc caccatgggc acttggtcaa acatcaaatt cccgtctttc tttagcttt
180

ccaagtcttc tggactctgt ataaacttct cttcaaactc cactcctgct gcagccagga
240

gccaccggat gcactccatt ctgccccggg cattgaagta gtgaagcact ggcttccag
300

acatagcagc aactgtgctt tcactgtcta gcgagaatcg tggcttctta
350

<210> 258

<211> 155

<212> DNA

<213> Rattus norvegicus

<400> 258

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tttcagcag ctccctctcc tcagttaggt caaaggcat gccccacaag taggagccaa
120

agacaaagag aatgtcatca ccatggtctg cctta
155

<210> 259
<211> 37
<212> DNA
<213> Rattus norvegicus

<400> 259

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37

<210> 260
<211> 40
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 260

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40

<210> 261
<211> 224
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
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gaagacttgt ctcaaaaata agagggaaaa agcaaattttagt gttgtcacaa atgtgtactc
120

gtcataaaaaa tgccatccat gcaaatgttat acacacacac actcacacac tcacacacac
180

acacacacac acanacanac acacacacnc ncnnataccca atta
224

<210> 262
<211> 31
<212> DNA
<213> Rattus norvegicus

<400> 262

gatcttggaaa agactgtttc cttcatgatt a
31

<210> 263
<211> 53
<212> DNA
<213> Rattus norvegicus

<400> 263

gatcttcgaa ctaaacgctg gggcgccac ctccgaatcc caatttctaa tta
53

<210> 264
<211> 63
<212> DNA
<213> Rattus norvegicus

<400> 264

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60

tta
63

<210> 265
<211> 105
<212> DNA
<213> Rattus norvegicus

<400> 265

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60

ttccaaattc tggaaaacat agacatttaa ctctgaagat gccta
105

<210> 266
<211> 66
<212> DNA

<213> Rattus norvegicus

<400> 266

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60

atgcta

66

<210> 267

<211> 137

<212> DNA

<213> Rattus norvegicus

<400> 267

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aaggcagaagc tgggcctgca tgtactcatc tacatcatgg aggccagtga catcaggagc
120

cccgtcacac actacta

137

<210> 268

<211> 197

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 268

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tgtttcttgg ctcctctttt gtcatctcac ttgtcctgcc ttctcctgac agtaacagct
120

gttcntcagg tcaactggat caggccccca tgtcctctaa ggagcaggaa gtcctcctac
180

ctaccctacc cacccta

197

<210> 269

<211> 40

<212> DNA

<213> Rattus norvegicus

<400> 269

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40

<210> 270

<211> 109

<212> DNA

<213> Rattus norvegicus

<400> 270

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60

cagggtttca cacatcttag gattggccat gaactcacta tgcagccta
109

<210> 271

<211> 51

<212> DNA

<213> Rattus norvegicus

<400> 271

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51

<210> 272

<211> 36

<212> DNA

<213> Rattus norvegicus

<400> 272

aattctacag aaccgtgttt atgatacagc cgttta
36

<210> 273

<211> 36

<212> DNA

<213> Rattus norvegicus

<400> 273

aattcagcct tagaaaaaaa taaaattgct gcctta
36

<210> 274

<211> 67
<212> DNA
<213> Rattus norvegicus

<400> 274

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60

gatatta
67

<210> 275
<211> 287
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 275

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catttggaaaga ccttagagtc agaatcttct tgtgttaagag ccctgaatgn tgtgaccaac
120

cccagtgtct acagcatctt tgcagctgtt aatctcactg ttctcggtcc tattgaagaa
180

attactggcc cagaaatgcc tttggtgtgt ttggcagact ttaaggcaca tgcgcaaaag
240

cagctgtcta agacctcctg ggacttattg aaggagaagc tgacgac
287

<210> 276
<211> 260
<212> DNA
<213> Rattus norvegicus

<400> 276

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60

gctgctggac atggcacgac acacggacat ggtcatggta aaatggaact tccagattac
120

agacagtgga aaattgaagg gacgccatta gaagcaatgc agaagaagct tgctgcacga
180

gggctgaggg atccatgggc tcgcaatgag gcttggagat acatggcgg cttgcagaca
240

atatcacctt cacgagcgta
260

<210> 277
<211> 299
<212> DNA
<213> Rattus norvegicus

<400> 277

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60

ctgaaggaga tggcccagtc gatcttcatg gcaggcatac tggttggagg acctgtgatt
120

ggagaactgt cagacagggtt tggccgcaag cctatcctga cctggaggtt tctcatgctg
180

gcagccagcg gctctggtgc tgccttcagt cccagcctcc ctgtctatat gatcttccga
240

tccctgtgtg gctgcagcat ctcggcatt tctctgagca ccgttatctt gaatgtgga
299

<210> 278
<211> 139
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 278

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60

gatgtgctga cccctgcgat ttccccaaat gcgggaaact cgactgcata atttgtggta
120

gtgggggact gcgttcgcg
139

<210> 279
<211> 328
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations

<400> 279

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gctggggaa gattggccat ggtggtaat atggcgagga ggccctacag aggatgttcg
120

ctgccttccc caccaccaag acctacttct ctcacattga tgtaagcccc ggctctgccc
180

aggtaaggc tcacggcaag aaggttgtcg atgccttggc caaagctgca gaccacgtcg
240

aagacctgcc tggtgccctg tccactctga gcgactgcat gcccacaact gcgtgtggat
300

cctgtcantt cagttcctga gccatgct
328

<210> 280

<211> 312

<212> DNA

<213> Rattus norvegicus

<400> 280

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60

aaaaaaaaacct gtcactgtcc ttttcctgct accatgtctt ccatcaagat tgaatgtgtt
120

ttaagggaga actacaggtg tggggagtcc cctgtgtgg aggaggcatc aaagtgtctg
180

ctgtttgttag acatcccttc aaagactgtc tgccgatggg attcgatcag caatcgagt
240

cagcgagttg gtgtagatgc cccagtcagt tcagtggcat tcgacagtca ggaggctatg
300

ttgccaccat gg
312

<210> 281

<211> 289

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 281

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cattctccct agcctgcntc tcttgccccg naacgcgggg ngcagggttg ctcctaaaan
120

ctctgtgcat ctgcgtat aaggaccaac agctgggggt gtagctcagg gcagagtctt
180

gcctggnaag cccggatgcn ttgaggcctt gaccacccnc agcacanana naaaatgaag
240

gaagacccaa ggnaccttct ggaagacotc atccccaaan aagcaagtg
289

<210> 282

<211> 250

<212> DNA

<213> Rattus norvegicus

<400> 282

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60

caatatggct tctgcaaggc gactctcatc cacagacttg gtgggaaaga ggttcagtg
120

gcctgcgcct gtagccccac cagctggccc acctgaatcc gtggtggtag gacccgtggc
180

agttcctcta ggacttccag accaccgaac ccaccatgac ctacggcatg cttctctcc
240

tgtggcttct

250

<210> 283

<211> 285

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 283

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tgcannaanc ggtcncaaaa gattcnaann caagatggna gcccncnacg aacaggncat
120

tgtgaatgtn cttaaggaag aacaggtnc ccanacaan atnaaagttg ttgggggtgg
180

tgtgntggca ngggttgtgc catcagnanc tcaangaang actgggtgat gagntgcccc
240

ttgttgatgn cacacaagan aanctaaacn gagagangan cgatc
285

<210> 284
<211> 266
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 284

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cagctttgc actttcnang tgacgatggn cntacagagg acccaatcct tgcttctgct
120

ctgttgctga ccctgctggg gtagggttg tacagccctc ctatggccaa gatagaatgt
180

accaacgggtt ccttagacag catgtggacc ctgaggggac aggccggcagg acaactactg
240

caacgtgatg atgcagagac ggaggt
266

<210> 285
<211> 250
<212> DNA
<213> Rattus norvegicus

<400> 285

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60

actgcctgga gccacccccc ttggggagac cttccctgcct cagctgtcgt cctgtgtcgt
120

cattcactaa agctcctgac gtcagattaa gcaagcagtg atgggttaca ttagagacaa
180

gccgcagaga taaggcctgt tgctgtttcg cagataatga tgagtttaa ttacccactg
240

gtttgtatgg

250

<210> 286

<211> 118

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 286

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60

cnnntncaat agtggagtga gcacgtgcc cccacgtgc ccaaanaactc cccaggc

118

<210> 287

<211> 262

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 287

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60

cctcaatggg gtcatgcctc caacacagag ctggcccccc gaccccaagt atgtcagcag

120

caaagccctg cagaganaga gcagcgaagg gtctgccaag gccccctgca tcctgcccatt

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ncattgagaa tggaaagaag gtcagctcca gcnttattca cctactacct gagcggacgg

240

cancaccccttg ncaaataatga gc

262

<210> 288

<211> 282

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 288

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ctngtcctgc tccttnnnt tgctcagatt ctagagctgc caatcagctc cacaagggtgc
120

agggctgggt tttcgagaat tggcttnat gaccggaaa aaaancntt nancttgat
180

agccgtggac tacctaata aacatcttct tcagggattc aggcagatct tgaatcagat
240

gacaaagtaa ggtgtggtct cggcggccct tcgganaggt gt
282

<210> 289

<211> 265

<212> DNA

<213> Rattus norvegicus

<400> 289

catagaccca tcttcagct gggatgatat taaatggctc agacggttga cctcaactgcc
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cattgttta aagggattt tgagaggtga ttagccccag gaagctgtta aacatggtgt
120

ggatgggatc ttagtgtcga atcatggggc acgacaactg gatgggtgc cagctactat
180

ttagccccctg ccagagatcg ttgaggctgt ggaagggaaag gtagaagtct tcctggatgg
240

gggagtcagg aaaggcacccg atgtt

265

<210> 290

<211> 199

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 290

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acaaggatgt gagatacact ctggagagat cagagacaag cacaganact gtgtcnact
120

agtgncttg cagtctnaac atctgtggag atcnanncan tggtanntna ctggcncgan
180

ncgtncnatg caaannacg
199

<210> 291
<211> 285
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 291

tacgcaccat ggacacangc acangcctca tcaganctat gcatacgtagt ntaaatcana
60

agtgtgatct ttttcaacta cagttatgga gaagcaactc attggccagn ttctggaga
120

ntttgtgnng tanttaatgc agcngtatgg naacnnaata cnatttangt ttcnngtgct
180

gntantaatg gtcnatgcct tctacagtgg gttgtccann nggantactt ccancgnat
240

aggngntgga gcntatgttc tcgcccata gangttgcn gngta
285

<210> 292
<211> 268
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 292

ccacgctgga gcgaanacca ttgctcgtga gcacatgggg agactgctgc accagctact
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ctgcgcaggg cacctctcta ctgtccagta ctaccaaggg ctgtatgaaa cactagaatt
120

ggctgaggac atggaaatcg acatccctca tgtatggctt tacctggcag aactgataac
180

acctattctt caggaagacg gggtaaccat gggagagctc ttttagggaaa ttacgaagcc
240

tctgagaccc atggcataag ccacttct
268

<210> 293
<211> 185

<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 293

ctcattgcca ccatgaactt ctccggcaag taccaagtgc agagccaaga gaacttttag
60

cccttcatga agggcgatgg gtctgcttag gacttcatcc nagaaaggga aggacntcaa
120

gggggtntnn gaatncngcn nnnanggaag aaantnnaac tcnccatcan ctannggncc
180

aangt
185

<210> 294
<211> 286
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 294

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60

ttaataagat gttctatTTT ctggtatgtat ataaaattat ctctacttaa tgtcataact
120

ggcaaaaaaa aaactatcat tgcaaATGCC tcccAGTGAA accaataact tctcanatAT
180

ttagaattat tggttataac tcactaacCT agtttCCTAA natcantTTA anatttgatt
240

tatngtanag cantggnnaa tgatGCCnCT ctnatgttgt ttnnac
286

<210> 295
<211> 225
<212> DNA
<213> Rattus norvegicus

<400> 295

gcctccccgc ttgcctGCC agttttatCC ctagaAGCAG ctagctactc caggtgcaca
60

ggtgccatgc agccccgaat gtcctcata gtggccctcg tggctctcct ggctctgcc
120

c gagctgatg agggagaggg atcattgtcg ctgggctcta tgcagggcta catgaaaca
180

gcctccaaga cggtccagga tgcactaagc agcatgcagg agtct
225

<210> 296

<211> 278

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 296

acaccatcna cctgtatgcn gtnactggcc gtgnngacat tccagccagc agcaagccat
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nttccatcaa ntatcanaca naaattgaca agccatccc natgcangtg acggntgtcc
120

aggacaacag catcagtgtc aggtggctgc cttcaattct nctgtggaca ggtaccgagg
180

nccagcggtt ccncaaaaant gggtaactgac naacanaatc tcaaactgtc nagtccagat
240

canacagaga tgnccattga aggntgcaac ccaccgtg
278

<210> 297

<211> 290

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 297

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agagaagtgc gaggtggana ggaaacctca ttgccaccat gaacttctcc ggcaagtacc
120

aagtgcagag ccaagagaac tttgagccct tcatgaaggn nannggnctg nctnaggnc
180

tcatncngaa angganggnc atcaaggggg tgtcagntat nctgcatgan ggganctcnt
240

caaatnanca ncactatgng tncaagtgtat cnaatgagtt cacttgggc
290

<210> 298
<211> 296
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 298

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gcccgaggta ggttaatcga agtctcgctg caggctctgc tgtaagtctg gcctcttggc
120

ctcacatctt ctgtgtggta tccttccta tctccagctt cctcagctgg tcagggagat
180

tgggtccaga actagaagcc ttaataatct gagcaggtaa gagaggagta aaatgtacag
240

tcttggacat tgactaaagg gtcctgcaga ggatatcaag gtaagtggct tggagg
296

<210> 299
<211> 277
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 299

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gtccccctcg gctgcttggg aaacggagcc ttccagaagg ggtggtgat gcattgagat
120

ctacagcacc aagatcagct gcaagggtgac ctcccgctt gtcacaatg ttgtcaccac
180

aagggtgtc aaccgtgcag acaaggccaa gaagtttctt ttgatgtgg a ctgcccaga
240

cagcctncat caccaacttc accttgatat ngatggg
277

<210> 300
<211> 287

<212> DNA
<213> Rattus norvegicus

<400> 300

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60

aaccatgaag gtagcaatta tctttcttct cagtggctt ggccctgctc aatttagcag
120

gtaacactac agctaagggtg attggggaaaa aggctaattg ccctaatacaca cttgttggat
180

gccccagggta ttatgatcct gtgtgtggta ctgacggaaa aacttacgcc aatgaatgca
240

ttcttatgctt tgaaaacagg aaatttggaa catctatccg cattcag
287

<210> 301
<211> 85
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 301

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60

gcccaggatg ttccctgaaag ggctg
85

<210> 302
<211> 295
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 302

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60

ccaacccagt gaggagccca ggatgtncn gaaggctgtg gtgctgaccg tggccctgg
120

ggccatcacc gggacccagg ctgaggtcac ttccgaccng gtggccaatg tcatgtggga
180

ctacttcacc cagcnaagca acaatgccaa ggaggctgtg gaacaactgc agaagacaga
240

tgtcactcaa cagctcaata ccctttcca ggacaaactt ggaacattaa cacct
295

<210> 303
<211> 279
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 303

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aggtgacaac cagggcatcc cgatcatgtc caacataaag ctgagagaag aacagcgcatt
120

aaccacaact tccccctgga tgtttccagtc accacacgttgccctgaag accacgtgtt
180

catttccaca ccaaacttca cnacacaggc caagacttcg agcgaaaaatggcagatctt
240

cattttgaag aaggctggca catgtttcta cagtctcgt
279

<210> 304
<211> 306
<212> DNA
<213> Rattus norvegicus

<400> 304

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60

tgcttcccgta tactgggctg agtgccggca gtacagtgtg acagtggtcc tgtatgtggg
120

tgaagtccctg cgataacttgt gtaatgtccc agggcaacca gaagacaaga aacatacagt
180

gcgggttcgca ttgggcaatg gacttcgggc agacgtgtgg gaaaacttcc agcaacgatt
240

tggtcccatt cagatctggg aactctacgg ctccacagag ggcaacgtgg gcttaatgaa
300

tatggg
306

<210> 305
<211> 296
<212> DNA
<213> Rattus norvegicus

<400> 305

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ggccttcctg ctcagtctat ttctggtgct gttcaaggca gtccaaattct acttacgaag
120

gcaatggctg ctcaaggccc tcgagaagtt cccatccacg cttcccact ggctttgggg
180

ccacgacctg aaggacagag aattccagca gtttcttacg tgggttagaga aattcccagg
240

tgcctgctta cagtggctct cagggagcaa aacacgagtc ctgctctatg accctg
296

<210> 306
<211> 147
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 306

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tcncctgctt catcctnagc ttggccagca cagtcggac tgcagacacc ggcaccacaa
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147

<210> 307
<211> 312
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 307

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120

gttcagtcat gcccgtggac atggccatga ggatttgctt ggcacattca ccacccctga
180

agagttcct gggtccttac aatggtcttc agcgaagaca ttttgtaat aaaccgaagc
240

ccttgaacc gtgttcagc gtcaagcagg aagccaaatc acagaaggaa tggaagagcc
300

cacacagcca ag
312

<210> 308

<211> 284

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 308

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120

gtttcctgt cagttcttt atagtcattt tcctacaacc tattagccca aagaaaactgg
180

gctggagggg agacttcaga ctggacggag caccgttca gagtcagaag cggtataanta
240

gctagagggg tcctccnacat cagaatacta aagggtctcc agag
284

<210> 309

<211> 293

<212> DNA

<213> Rattus norvegicus

<400> 309

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agacaggact gtcctgccga cccaccatga tccaggctgc actgttcatt ggctgttatct
120

tactgtcctc ggtgaccggcc tttccatgga agactcagga tggtggcctg ccccatcagc
180

cagctggcac agaaaacttag cctacacaac tgctctacag caagagtctt cctccgacct
240

ccagtacctg tcggaacctc ctaagcatgg cgccccctgcc ccctgttagtc ctc
293

<210> 310

<211> 208

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 310

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gtccctctgc ttgtttctn caagccatnt ggctctacct gctggcactg gtgggcctgt
120

ggaacctcct gcgcttgttc agggagngga nnngtgtnag cnatctccaa gacaagtatg
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tcttcatcac gggctgtat caggctt

208

<210> 311

<211> 280

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 311

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gctccctcct gccaccnnct tctggctcct caatgtgctc ttccccccgc acaccacgcc
120

caaggctgaa ctcagtaacc acacacggcc tgcatacctc gtgcctggct gcatggggaa
180

ccggctagaa gccaaagcttg ataaacccaa tgtggtaaac tggctgtgt accgaaanac
240

agaggatttt ttaccacngn ctggattcan annttcnnc
280

<210> 312
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<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 312

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120

gaagactttgg acatggactg agacctcagt tacagacAGC ctgttGtgag acttctcago
180

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181

<210> 313
<211> 174
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 313

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ttgggattgc cnaaganaac tttgcaaaat gtttGtaata aagtttGtgg tgaaanacga
120

agatttgatt tcattggctt atcccaagtc aggaacgacg cgccggctcg naat
174

<210> 314
<211> 289
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 314

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ctgggtggtgg ctatttgctc caggcctaac cagtggggaa gtggattgc gggacacgtg
120

tctcagcctg gacacttagg gtttcttagc ttgtgaagcc aatccnngtg gaaccgatgt
180

ggatnaggnt gcantgnnc tctgtttccc cccaaacttc cccagtaacc tttggcaag
240

gtggatgaac ncagngattt ttgaaaagtc aaaaacttcg gtttgttta
289

<210> 315

<211> 309

<212> DNA

<213> Rattus norvegicus

<400> 315

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gggagcgaag tagggtctgc cagccccag gagcaacttg acggatcagc cagcccagtg
120

gagatgcagg atgagggatc agaggagtt cacgagacag gagagccct gccccccttc
180

ctgctgaagg agggtggaga tgaggggcta cactcggcag agcaggatgc cgatgatgag
240

gcagctgatg atacagatga caccagctcg gtgacctcct ctgccagtct accacctcct
300

ctcagagtg

309

<210> 316

<211> 211

<212> DNA

<213> Rattus norvegicus

<400> 316

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gcttctacct tggccacacgc tcacccactc cggcgtaga ggctctagga gctgccctgg
120

acgctgcacc ttctgaccca gtgcctgcca agcttcgtgc taatataaag tggaaatccc
180

cagccatatt catctatact tcagggacca c
211

<210> 317
<211> 282
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 317

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cgtttcacg ccccggtgc agacagctag gaggcttat ctagttgaa ccaggctgct
120

ggagctcgct cttccctct cttttttcc acgaggctgt ttttttattt ggctgcattgc
180

atgaaatccc aatggtgttag accagtggcg atggatctag gagtttacca actgagacat
240

tttcaattt ct当地tgc gtcttgctg ggaatgaaaa cg
282

<210> 318
<211> 261
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 318

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catggtaaaa ctgcttaat ttacactttt gattgggtgc tgggaataa acctaaagca
120

tggcatatta atgaagaaca tatggtaacc atgaactcca tctctggatt cctttatcg
180

cnattttta aaggtaat attcgacca gagaatgaca agtggtttg acaacatact
240

ctaggccttc tattaaaaac a
261

<210> 319

<211> 273
<212> DNA
<213> Rattus norvegicus

<400> 319

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ttcttgttac tcttagtcag gggacaccca aagtcccgtg gcaacttccc accaggacct
120

cgtcccccttc ccctcttggg gaacctcctg cagttggaca gagggggcct cctcaattcc
180

ttcatgcagc ttcgagaaaa atatggagat gtgttcacag tacacctggg accaaggcct
240

gtggtcatgc tatgtgggac agacaccata aag
273

<210> 320
<211> 205
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 320

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cttagtcagg ggacaccnaa attccntggg aaatttccna caagnacttg nnccctttcc
120

cntntngggg aacncntgaa nttggaaana ggaggcncctt tnantncntt cangnagttt
180

cgcgaaaaat atgganatgt ntnca
205

<210> 321
<211> 289
<212> DNA
<213> Rattus norvegicus

<400> 321

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actcttagtc aggggacacc caaagtcccg tggcaacttc ccaccaggac ctgcgtccccct
120

tcccctcttg ggaaacctcc tgcagttgga cagaggaggc ctccctcaatt ccttcatgca
180

gtttcgcgaa aaatatggag atgtgttac agtacacctg ggaccaaggc ctgtggtcat
240

gctatgtggg acagacacca taaaggaggc tctggtgggc caagctgaa
289

<210> 322

<211> 265

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 322

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ctccaaacgta ccagatctgc ttctcagctc ggtgatccgg ctgaggcagc catgtgcccc
120

agttctgttg ggaatggcct catgtttctg cctctggggg acctgctgaa aaccaggctc
180

aaggccactg ctcacatctt cctattgcag ttctccaaag tcccaaggct tttcntatt
240

cctgtaatg gcactgaaga agtca

265

<210> 323

<211> 234

<212> DNA

<213> Rattus norvegicus

<400> 323

gtaaaatgcc atacactgat gcagtttatcc atgagattca gaggtttca gatcttgtcc
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ctattggagt accacacaga gtcaccaaag acaccatgtt ccgagggtac ctgcttccca
120

agaacactga agtgtacccc atcctgagtt cagctctcca tgacccacag tactttgacc
180

acccagacag cttcaatcct gaacacttcc tggatgccaa tggggcactg aaaa
234

<210> 324
<211> 235
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 324

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aaccacatag ctggctgaan gctgtgtct ttgggctcct gcttattctt atccatgtgt
120

ggggtcagga ctcaccagag tccagctcca tcaggaccac acaanatann attnanaaan
180

gnaagcttga cnacgtgagg gacactaaag ctgggtgtcca nacaacanaa ngttc
235

<210> 325
<211> 263
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 325

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tattttgaca tgtgaacaga gatttcatga gtacacatct catgctgagt cacttccctc
120

ttcctcctaa tagccccacgt ccccacttat cagccctcca tggctgtga tctgtgctaa
180

tggactctgt atatggtctc agtgctatgt ctacagactt acatagtatg tatggttcag
240

gtaaacagat cacagagtgt gtg
263

<210> 326
<211> 300
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 326

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aacaggaact gatacacgag ccaaaccagc aatgtcttcc cctgcacagc ctgcagttcc
120

tgccccactg gccaaacttga agattcaaca caccaagatc tttnataaaca atgaatggca
180

tgattcagtg atggcaagna attacctgtc cttaaccctg caatgaggag gtcatctgac
240

atgtggaaga agggacaagg cagatgttga caagctgtga agccgcaaga caggcttcc
300

<210> 327
<211> 350
<212> DNA
<213> Rattus norvegicus

<400> 327

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ataataaaagg agctatccag agagaacctg caggctgttc taaaggatac agcagcacaa
120

atgatgcttc ctccctgagtg tggtgacctg ctcatggaag agtacatggg gaacactgtat
180

gattcccaga ccctacaaat acagtacaca gagatgatgg gagacttcc gtttgtatc
240

cctgcactcc aagtagcaca ctccctgacctg tccatgccc ctgtctactt ctatgagttc
300

caacatgcac ccagctattc aagaatgtca ggccacccca gtgaaggtga
350

<210> 328
<211> 258
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 328

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agggccctca gattnacaag gagcaacatg ataaaatcct tgatctcant gagagtggga
120

agaangaagg agccaanctn gagtgtggtn taggacgcng ggggnacaaa ggcttcnttg
180

tccanccnn agtcatctcc aatgtgacng atgagatgng cattnccnaa gagngatat
240

ttggancagn gcaacaaa

258

<210> 329

<211> 245

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 329

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atgtccacct cttagggtagc agtcttggag cccatgctgc tggcgtggca ggaagtctga
120

ccaacagaag gtcaatagaa ttactggctt ggatccagct gggcctaact ttgagtatgc
180

agaagcccct agtcgcctt ctcctgatga tgccgatttc gtagatgtct tacacacatt
240

tacca

245

<210> 330

<211> 191

<212> DNA

<213> Rattus norvegicus

<400> 330

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taaaggagga ggccaaatgt ttagtggagg aactgaagaa tcatacgagga gtctccctgg
120

acccaacgtt cctcttccag tgcgtcacag gcaacataat ctgctccatt gtctttggag
180

agcgctttga c
191

<210> 331
<211> 265
<212> DNA
<213> Rattus norvegicus

<400> 331

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tgacagacct gcagggatgg acctgcttc agctctcaca ctggaaacct gggtcctcct
120

ggcagtcgtc ctggtgctcc tctacggatt tgggaccgc acacatggac ttttcaagaa
180

acaggggatt cctgggcca aacctctgcc ttttttggc actgtgctga attactata
240

gggttatgg aaattcgatg tggag
265

<210> 332
<211> 296
<212> DNA
<213> Rattus norvegicus

<400> 332

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caccatgtcg caagcccgcc ctgccactgt gctgggtgcc atggagatgg gtcgccccat
120

ggatgtgacc tccagctccg cgtcggtgcg cgcccttcctg cagcgccgcc acacggagat
180

agacaccgcc ttctgtatg cgaacggtca gtctgagacc atccttaggag acctggggct
240

cggactggc cgcagcggct gcaaagtaaa aattgccacc aaggctgccc caatgt
296

<210> 333

<211> 214
<212> DNA
<213> Rattus norvegicus

<400> 333

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aaaggcaaac ctgtccctgt gaaagaagtg tttggtgctt acagcatgga tgtgatcacc
120

agcacatcat ttggagtgaa tgttgattcc ctcaacaacc cgaaggatcc ttttgtggag
180

aaagccaaga agctcttaag aattgatttt ttg
214

<210> 334
<211> 183
<212> DNA
<213> Rattus norvegicus

<400> 334

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atgagggttg ctctcatgaa tatgaaactc gctctacta aagttctgca aaacttctcc
120

ttccagcctt gtaaggaaac acagataacct ctgaaattaa gcagacaagg acttctcaa
180

cca
183

<210> 335
<211> 174
<212> DNA
<213> Rattus norvegicus

<400> 335

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acaaacgtgg tggaagccaa ccagccagt accatccaga actggtgcaa gcggggccgc
120

aagcagtgca agacgcacac ccacatcgat atttttaccg gtgcctagtt ggtg
174

<210> 336
<211> 241
<212> DNA
<213> Rattus norvegicus

<400> 336

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tggaggaact gagaaaaacc aatggctcac cctgtgaccc cacgttatac ctgggctgtg
120

ctccttgcaa tgtcatctgc tccattattt tccagaatcg ttttgattat aaagatcagg
180

attttcttaa cttgatggaa aaactcaatg agaacatgaa gatttgagc agtccctgga
240

c
241

<210> 337
<211> 289
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 337

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aaaaaaagtgg gtgaaggctca agtaccccaa actcatctcc tattcctaca tggAACGTGG
120

gggccacttt gctgccttg aagagcccaa gcttctggcc aggacatccg caagttcgtg
180

tccctggctg agctgnagta ntnacggntt annaaantgt ggctttagna naancctgg
240

tccccanagn aannttgggn aaccccccctn gggaaaaant tntcccccc
289

<210> 338
<211> 243
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 338

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ggtcctcctg gcagtcgtcc tggtgctcct ctacggattt gggaccgcac cacatggact
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tttcaagaaa caggggattc ctgggccaa acctctgcct tttttggca ctgtgctgaa
240

tta
243

<210> 339
<211> 289
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<213> Rattus norvegicus

<223> unsure at all n locations
<400> 339

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atttgctgaa cagacactgca gggatggacc tgctttcagc tctcacactg gaaacctggg
120

tcctcctggc agtcgtcctg gtgctcctct acggatttgg gacccgcaca catggacttt
180

ncaagaaaaca ggggattcct gggcccaaac ctctgccttt ntggcatg tgctgaattn
240

ctatatgggt ttatggaaat tcgatgtgga gtgccataaa aagtatgga
289

<210> 340
<211> 289
<212> DNA
<213> Rattus norvegicus

<400> 340

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ctggggtaag acaactcttg cgaagaagcc agactcactg ggaacgtatg ttgaatggtt
120

cctcaaagga aatgttccgt atggatcatg gttttagcac atccgtgcct ggctgtctat
180

gcgagaatta gacaacttct tgttactgta ctatgaagac ataaaaaagg atacaatggg
240

aaccataaaag aagatatgtg acttcctggg gaaaaaatta gagccagat
289

<210> 341

<211> 278

<212> DNA

<213> Rattus norvegicus

<400> 341

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ctttagagag tctgtaaaaa agatgttcaa atcaatggtg tgtttatgcc caaagggtca
120

gtggcatga ttccatctta tgctcttac cgtatccac agcactggcc agagccttag
180

gaatttcgcc cagaaagggtt cagcaaggag aacaaggca gcattgtcc ttatgtatat
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ctgcccttg gaaatggacc caggaactgc attggcat

278

<210> 342

<211> 312

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 342

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agtgccacca tgcctgangc cgtggctgaa gaagtgtctc tattcagcac gacggacatg
120

gttctgtttt ctctcatcgt ggggtcctg acctactggt tcatcttag aaagaagaaa
180

gaagagatac cgaggatccag caagatccaa acaacggccc caccgtcaa agagagcgc
240

tgcgtggaaa agatgaagaa aacgggaagg aacattatcg tattctatgg ctccccagacg
300

ggaaccgctg ag
312

<210> 343
<211> 287
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 343

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ggcgccgtga ctccgggcgc tgtggaccat ggctccgccc caggcgccca acagggaccg
120

tgcangccag gaggatgagg accgttggga acacgggggg accgcaaggc ccggaagccc
180

ctgggtggaga agaagcgacg cgcgccgatc aacgagagtc ttcaggagtt gcggctgctg
240

ctagcgggca ccgnngtgcag gccaagctag agaacgccga ggtgctg
287

<210> 344
<211> 232
<212> DNA
<213> Rattus norvegicus

<400> 344

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ggacttcctg gcccgtttg agggcctgaa gaagatctct gcctacatga attgcagccg
120

ctacacctca acacctatat ttgcgaagtt ggcccaatgg agtaacaagt agggccttgc
180

tacactggca ctcacagaga ggacctgtcc acattggatc ctgcaggcac cc
232

<210> 345
<211> 223
<212> DNA
<213> *Rattus norvegicus*

<400> 345

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tggatctttt attcatgagc aattcagccc caaaaatgaat ttggaaaact tttgcctgaa
120

gtacttattg aaataacaatc aagagacctg ctgaatattt tgatgcgttc tcaaaagtgt
180

atggtcctgt atttactctt tactttggca tgaagccac tgt
223

<210> 346
<211> 278
<212> DNA
<213> *Rattus norvegicus*

<223> unsure at all n locations
<400> 346

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gatcctgcag gcaccctggc cttctgcact gtggttctct ctccttcctg ctcccttc
120

cagctttgtc agccccatct cctcaacctc accccagtca tgcccacata gtcttcattc
180

tccccacttt ctttcatagt ggncccttc tttattgaca ccttaacaca acctcacagt
240

cctttctgt gattgaggtc tgccctgaac tcagtctc
278

<210> 347
<211> 295
<212> DNA
<213> *Rattus norvegicus*

<223> unsure at all n locations
<400> 347

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actctcacga agacaccagt gccaccatgc ctgaggccgt ggctgaagaa gtgtcttat
120

tcagcacgac ggacatggtt ctgtttctc tcatcgtggg ggtcctgacc tactggttca
180

tcttttagaaa gaagaaagaa gagataccgg agttcagcaa gatccaaaca acggccccac
240

ccgtcaaaga gagcagcttc gtggaaaaga tgaagaaaac ggaaangaac ttatc
295

<210> 348

<211> 230

<212> DNA

<213> Rattus norvegicus

<400> 348

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ctggttgtct ctgttaattt ctttgatag taaccttgc tctgttaattt gatcaagaat
120

ttttcatgaa aatgtgaact attgtgacaa ctttaattgt agatttgta tcagatgttt
180

tagatgcatt attctacact aaatgttaca tggaaaaaat gtgaataaac
230

<210> 349

<211> 282

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 349

ccggctcta tattaggcca acagcgcccc tagccgaggc tgttcgtgaa gaagggcact
60

ggtcggttta gcgtcctccg ctgcngtgcc caccggcgtc tcgtcgagag cccgcgcagg
120

acccgggaca ctgtcagac atggagactg tcgttcgcag atgcccattc ttatcccgag
180

tccctcaggc ntctctgcag aaggcaggaa aatctctgct gttctatgct caaaactgccc
240

ccaagatgat ggaagtccgg gccaagccgg ctctcggac cg
282

<210> 350
<211> 280
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 350

ccgaggcagt tcacccgagg ccgatctccg aggtctgcc a cggctactt cccacagcct
60

ccgccccatggg tctggagctt ctacctggac ctgatgtccc agcnntgccg tgccgtctac
120

atcttcgc ca agaagaacgg catccccttc cagctgcgta ccatcgagct gctaaagg
180

cagcattaca ctgatgcctt tgcccagg tg nacccttga ggaagggtgcc ggctttgaag
240

gatggggact tcgtcttggc agagagtgtg ccatcttgct
280

<210> 351
<211> 309
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 351

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ctttgactga nacgaagacc actgtggagc tccttccgt gaatggcga tt cagcctgg
120

atgatctcca accgtggcat cttttgggg tggactctgt gccagccaa acagaaaatg
180

aagggtctgg gttgacaaac atcaagacag aagagatctc agaagtgaag atggatgcgg
240

agttcggaca tgattcangc ttcaaatccg ccatcaaaaa ctgggtggct tgcagaagng
300

tgggtcaaa
309

<210> 352
<211> 228
<212> DNA
<213> Rattus norvegicus

<400> 352

gctggctgca aaatcttcga gagccgaccc aaactggctg cgtggcgtca gcgggtggaa
60

gccgcagtgg gggagagcct cttccaggag gcccatgaag tcgtcctgaa ggccaaagat
120

atgcctccct ttagtggaccc gaccttgaag gagaaactga agctctctgt tcaatgcctg
180

ctgcactgag ggaacagcct gaagtcaagg gaaacttggt gtgtgcgt
228

<210> 353
<211> 298
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 353

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cctggtcaga ggccatgcaa aagttcatgg tcatcttcca ccaggacccc gtcccttacc
120

cctcttggaa aacctcttgc agatggacag aggaggctt cgtaagtctt tcattcagct
180

tcaagaaaaa cacggagatg tgttcacagt atactttgga cctaggcctg tggcatgct
240

gtgtggacaca cagaccataa gggaggctct ggtggacatg ctgaggnttc tctggcgg
298

<210> 354
<211> 326
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 354

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tactactttc aaggcagggg aaggatggag tcgatccgct ggctgctggc tacagctgga
120

gtggagtttg aagaagaatt tcttgagacg agagaacaat atgagaagtt gcaaaaggat
180

ggatgcctgc ttttggcca agtcccattg gtggaaatag acgggatgct actgacacag
240

accagagcca tcctcagcta cctggccgcc aagtacaact tgtatggaa ggacctgaan
300

gagagagtcg ggattgacat gtatgc
326

<210> 355

<211> 274

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 355

tccttctcct ctttgctgtc ctccctcagct tcttgctatt cctggtcaga ggccatgcaa
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aagttcatgg tcatcttcca ccaggacccc gtcccntacc cctcttgga aaacnctttg
120

aagaatggac agaggaggct ttgtaagtct ttcattnagc ttcaagaaaa acacggagat
180

gtgttcaccaa gtatacttgg aactaggcct gtggtcatgc tgtgtggac acagaccata
240

agggaggctc tggtgacat gctgangctt ctct

274

<210> 356

<211> 148

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 356

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gagagcgccag gttgtatcac caacatgggg gactctcact aagacaccag tgccaccatg
120

cctgaggccg tggctgaaga agtgcctc
148

<210> 357
<211> 302
<212> DNA
<213> Rattus norvegicus

<400> 357

ttagatctga ctgaaatgtatccaaattt gtaatatgtc ccccaagacca aagagaagcc
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aagaccgcct tggcaaaaaga caggacaaaa aaccggtaact tgccctgcctt tgaaaaggtg
120

ttgaagagcc atggccaaga ctaccttgta ggtaacaggc tgaccgggtt agacatccac
180

ctgctggaac ttctcctcta ttttgaagag ttttatgccat gccttctgac ctcttcctt
240

ctgctgaagg cttcaagag cagaatcagc agcctccccatgtgaagaa gttcctgcag
300

cc
302

<210> 358
<211> 286
<212> DNA
<213> Rattus norvegicus

<400> 358

cggaagtgaa ccaaggcaact gagcggcatc taatgcacct ggagttggac atctcagact
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ccaagatcag gtatgaatct ggagatcact tggctgtgtt cccagccat gactcagccc
120

tggtcaacca gattggggag atcctggggag ctgacacctgaa tgtcatcatgt tctctaaaca
180

atctcgatga ggagtcaaac aagaaggcatc cgttccccctg ccccaaccacc taccgcacgg
240

ccctcaccta ctacctggac atcactaacc cgccacgcac caatgt
286

<210> 359

<211> 320

<212> DNA

<213> Rattus norvegicus

<400> 359

caagttcctg cagaacaagg ctttcctaac aggacccat atctccgtgg ctgacttggt
60

gccccatcaca gaactgatgc atcctgtcag tgctggctgc aaaatcttcg agagccgacc
120

caaactggct gcgtggcgtc aggggtggaa gccgcagtgg gggagagcct cttccaggag
180

gcccatgaag tcgtcctgaa ggccaaagat atgcctccct tcatggaccc gacattgaag
240

gagaaaactga agtctctgtt caatgctgct gcatgaggga acagcctgaa gtcaaggaa
300

acttgtgtgt gcgtgtgtgt
320

<210> 360

<211> 288

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations
<400> 360

tngcctctgt ccaccgaggc agttcacccg aggccgatct ccgaggctcg ccagcggcta
60

cttcccacag cctccgcat gggctctggag ntctacctgg actgatgtcc cagccctgcc
120

gtgccgtcta catcttcgcn aagaagaacg gcatcccttc cagctgcgta ccatcgagct
180

gcttaaaggc cagcattaca tgatgcnttg cncaggtgaa cttttgnngaa aggtgccggc
240

nttgaagcng gagattcgtc ttgccaanna tgtggcancn tgctgtat
288

<210> 361

<211> 272

<212> DNA
<213> Rattus norvegicus

<400> 361

gaactctgct caacagcctc tttctctagt tcctgcagac aaaatccag aataaggaaa
60

ctctgaacca ggagtcatgg aagtcaaacc caagctctac tacttcaag gcagggaaag
120

gatggagtcg atccgctggc tgctggctac agctggagtg gagttgaag aagaatttct
180

tgagacgaga gaacaatatg agaagttgca aaaggatgga tgccctgcttt ttggccaagt
240

cccatttgtg gaaatagacg ggatgctact ga
272

<210> 362
<211> 286
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 362

ggccccatgga gcacacccag gctgtggact atgttaagaa gctgatgacc aagggccgct
60

actcaactaga tgtgtggagt aggagctacc accctccac ccctcgatcc ctgtaatcac
120

ctaacttctg ccgacacctca cctctggtgg ttccctgcctg gcctggacac agggaggccc
180

agggactgac tcctggactg agtngtgccc tcctgggccc ctaaggcagag tccggatccat
240

tgttatcaggc agcccagccc caaggcacat ggcaagaggg attgac
286

<210> 363
<211> 288
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 363

gtaaaagang ccttgattga tcatggggag gagtttgctg aaagaggaag cttcccagta
60

gctgaaaaaaaaa ttaataaaaga ccttggaaatt gtttttagcc atggaaatag atggaaagaa
120

ataagacgct taccctcacf actctgcgga atttggcat gggganaagg aacattgagg
180

ntcgtgttca anaggcaanc ccggnancct nggggaggac ctnggaaan ccatggggcn
240

caccgtgnna ccccangtnt atccctgggc tgngncctt gnannacc
288

<210> 364

<211> 237

<212> DNA

<213> Rattus norvegicus

<400> 364

tcacagctaa agtccaggaa gagattgatc gtgtggttgg caaacatcg agcccttgca
60

tgcaggacag gagccgcatg ccctacacag atgccatgtat tcatgaggtc cagaggttca
120

ttgacacctat tcctaccaac ctgccacatg cggtgacactg tgacattaag ttcaggaact
180

acctaataacc caagggaaca acaataataa catcaacttc atcagtgtc catgaca
237

<210> 365

<211> 304

<212> DNA

<213> Rattus norvegicus

<400> 365

ggagaatgga gcccatccgg tggctctgg ctgcagctgg agtagagttt gaagaacaat
60

ttctgaaaac tcggatgac ctggccagc taaggaatga tggagttt atgttccagc
120

aagtgcacat ggtggagatt gatggatga agctggtgca gaccagagcc atttcact
180

acattgccac caaatacaac ctctatggga aggacatgaa ggagagagcc ctcatcgaca
240

tgtatgcaga aggagtggcg gatctggatg aaatagttct ccattaccct tacattcccc
300

ctgg
304

<210> 366
<211> 218
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 366

ggcactggtc ggtagcgt cctccgctcg agtgcacc gncgtctcgt acgagagccc
60

gcgcaggacc cggcagact ntgcagacnt ggagactgtc gttcgcaga tgccattct
120

tatcccagt ccctcaggcn tttctgcaga aggaggaa atctctgctg ttctatgctc
180

aaaactgccc caagatgatg gaatcggggc naancgg
218

<210> 367
<211> 269
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 367

gtcnccatg gatctggta ctttccttgtt acttactctc tcctctctca ttctctctc
60

actctggaga nagnccgct aggagaagga agctcnctcc tggcccaact cctctccna
120

ttatcggtaa tttccctccn gatagatgtg aagaacatca gccaatccta accaagtttt
180

caaaaaccta tggccctgtg ttcactctgt atttgggctc acagcccnct gtcatattgc
240

atggatntga agcnataaag gagctctgt
269

<210> 368

<211> 270
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 368

gagaccggcca gttccgtctc tactcttttg tgaggactgc agccaacacc gctgacaatg
60

cagatctttg tgaaaacctt aactggtaag accatcaccc tggaggtcga gcccagtgac
120

accattgaaa atgtcaaggc aaagatccag gacaaggagg gcatcccccc tgaccagcag
180

aggctgatct ttgcaggcaa gcagctggaa gatggccgca ccctgttcag actacaacat
240

ccagaaggag tccaccntgc acctggtcct
270

<210> 369
<211> 238
<212> DNA
<213> Rattus norvegicus

<400> 369

ggaagcaatg attctaggtg tgtttctggg gcttttcta acatgtctgc ttctcatttc
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actgtggaag cagaattttc agagaagaaa ctttcctcct ggccccacac ctttccttat
120

cattggaaat attttcaga tagatcttaa ggacatcagc aaatctctga ggaatttttc
180

aaaagtctat ggccctgtgt tcaccctgta ctttggcagg aagcctgtg tgggttta
238

<210> 370
<211> 260
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 370

aaaggaccag ttctgtattt gtggtagta ggctacgttg tcatggggc ctatggcaac
60

ccaggtacct gaaaaccagt ttcagggaca gcagtggaga acatactcta ggcaaacata
120

ctggcctgtt tccattataa caagataacct aaggccaact actttnttta ccaagagaag
180

aggtttgtta cagcacaaga tgaggtggcc cgctcgtag cccttgagg gcatgtgga
240

aaataaacacg tggtgaggga
260

<210> 371

<211> 283

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 371

cgcgcgtccc ttacccgtt ggctgcggcg atgcgtacga tgagctggat ggctcggtc
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atgtagaagc gaccgtccnc gcccacaaacc agcgtggcct cctgcctcaa cgccggctcc
120

acggtggaga cgatgcttg gatgaaattc tccgcatagt tagcgttgcc ctggaacacc
180

tncactcgct tccgcaaccc gctggtgccc ggcttctgat ccggntatgc ctgcgtcttc
240

actgtcacga tcttcaccat ggtggccggg gctgcgnngc gac
283

<210> 372

<211> 273

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 372

aaaaagttca tgcctatcgt ttacactncc acngngngtc ntgcatgnca gcaatacagt
60

tggcattccg gaagccaaga ngcctttta tcagnatcca cganaaaggg natattgctt
120

cagttctgaa cgcatggcca gaagatgtt tnanngctat tgtggtgact gatggatag
180

nggatcctnc ggntngggcg acctttgttn tannggggtg ggcatncctg gggtgtaaag
240

ggtccctgna aacaggttng gggggtnngat ccc
273

<210> 373
<211> 301
<212> DNA
<213> Rattus norvegicus

<400> 373

tacggaagta gttcccgctg cttatgccat ggtcctggaa ctgtacctgg atctgctgtc
60

gcagccctgt ccgcgctatt tataatcttcg ccaagaagaa caaatatcccc ttccagatgc
120

atactgtgga gctgcgcaag ggtgagcacc tcagcgatgc ctttgcagg gtgaacccca
180

tgaagaaggt accagccatg aaggatggtg gcttcacctt gtgtgagagt gtggccatcc
240

tgctctacct ggccacaag tataaggttc ctgaccactg gtaccccaa gacctgcagg
300

c
301

<210> 374
<211> 309
<212> DNA
<213> Rattus norvegicus

<400> 374

gggtctccat ggatctggtc acttcctgg tacttactct ctcctctctc atttcctct
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cactctggag acagagctct aggagaagga agctccctcc tggcccccact cctctcccaa
120

ttattggtaa ttccctccag atagatgtga agaacatcg ccaatccta accaagttt
180

caaaaaccta tggccctgtg ttcactctgt atttgggtc acagcccaact gtcataattgc
240

atggatatga agcaataaaag gaagctctga ttgataacgg ggagaagttt tctggtagag
300

gaagctatc

309

<210> 375

<211> 298

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 375

gtacccacat gtcacagcta aagtccagga agagattgac cgtgtgattg gcagacatcg
60

cagccccctgc atgcaggata gaaaacacat gccctacaca gatgccatga ttcatgaggt
120

acagagattc attaactttg tcccgaccaa cctgccccat gcagtgcacct gtgacattaa
180

attcaggaac tacctcatcc cgaaggaaca aaagtgttaa catcaactgac atcagtgctg
240

catgacagca aggagttccc naacccagag atgtttgacc ctggccactt tctagatg
298

<210> 376

<211> 234

<212> DNA

<213> Rattus norvegicus

<400> 376

cagacatcgc agccccctgca tgcaggatag aaaacacatg ccctacacag atgccatgat
60

tcatgaggga acaaaaagtgt taacatcaact gacatcagtg ctgcattgaca gcaaggagtt
120

cccccaaccca gagatgtttg accctggcca ctttcttagat gagaatggaa actttaagaa
180

aagtgactac ttttgccctt tctcagcagg aaaacgagct tgtgttggag aggg
234

<210> 377

<211> 267

<212> DNA

<213> Rattus norvegicus

<400> 377

gtcctgacca ggctacgatc tggcacggcg gatgtctatt gtctatgcac taggcgcctg
60

gtcggtgctg ggctcgccga ttttcattac acgaaaaccg aagatgtcag actatgggaa
120

aatgaagag gatgactcaa gcaatgaaat gccttttct acaagtgaag actctgattt
180

agcgatggaa agggctgagc ctattaaagg gttttatacg aagacaattg taaagtattc
240

agaaaattct gttccattac tcagagg
267

<210> 378

<211> 249

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 378

aatccgnag aggatccacc tgagaccta ggncgcctta ttcttctttg tcaacaacac
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tatccctccc accagtgcata ccatgggaca gctgtatgag gacaaccatg aggaagacta
120

ttttctgtat gtggcctaca gtgatgaaag tgtctacggg aaatgaggca gaagcccagc
180

agatgggagc gcctggactt ggggttaggg gaggggtgcg tgtggactt gggaaaccag
240

agggagggc

249

<210> 379

<211> 292

<212> DNA

<213> Rattus norvegicus

<400> 379

gaagggagct cagcacgttc agccctgcaa gggcagtac aaaaaattga gagtaaagct
60

cgaagagaga cttgtttaaa gaaaacggca atggatttga tcccaaactt ttccatggaa
120

acctggctgc tcctggttat cagcctggtg ctcccttacc tataatggAAC tcattcacat
180

ggaattttta aaaagttggg aattcctggg cccaaacctt tgccTTTCTT ggggacgatt
240

ctgcttacag gaagggtctt gggaaATTGAC aaataactGCC ataaaaAAATA TG
292

<210> 380

<211> 168

<212> DNA

<213> Rattus norvegicus

<400> 380

ctagccccgtat tggagttatt tttattcctg accacgattt tacaaaactt taagctgaaa
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tctgtacttc acccaaAGGA tatcgatACA actccAGTTT tcaatggatt tgccTCTCTG
120

ccaccatttt atgagctgtg cttcattcct ctctaaAGAG atcaaatt
168

<210> 381

<211> 298

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 381

accagtttct ggttccactc gcagagaAGC agagaAGCGG agnaAGCGGC gcgTTCCAGA
60

acctncccc aagaccAGCC tctcccAGAG catccccACC gcgaaggcan accttctcca
120

gagcataACCC cagcggAGCG naccTTCCC cagAGCATCC ccggccGCCAA gcgcaACCTT
180

ccagaAGCAG agagcGGCGA catggCCAAG aaaACAGCAG tcggcatcga cctggGCACC
240

acctaACTCGT gcgtgggcgt gttccAGCAC ggcaaggTGG agatcatcgc caacgacc
298

<210> 382

<211> 297

<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 382

ananaataga agaacaccag gaatcattgg atgttacaaa ccctcgatgt ttttgttatt
60

attacctgat taaacaaaaa caggcaaaca acatcgaaca atcagaatat tcacatgaaa
120

atctgacatg cagtatcatg gatctcattg gtgcaggac agagacaatg agcacaacat
180

tgagatatgc tctctgttt ctgatgaagt acccacatgt cacagctaaa gtccaggaag
240

agattgaccg tgtgattggc agacatcgca gccctgcat gcaggataga aaacaca
297

<210> 383
<211> 234
<212> DNA
<213> Rattus norvegicus

<400> 383

aacgcagccg actctgcagc attgccatgt caggaatgtt attggaaatc tttgtgtgc
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tccttgtgg cgccatcatt agtgaagccc tcgggtggcc ctttgtttt tatatcttg
120

gaagtattgg tgtggctgtc tgccctctct ggctcattct gtttatgtt gaccctgtct
180

ctcacccatg gataagtagc ccagaaaagg agtataatttt atcctccctg gacc
234

<210> 384
<211> 299
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 384

agctgccatc ttgcgtcccc gcgtgtgtgc gccttatctc agctggtctg cccgagacnc
60

tctgagcgtg aaccttagtc ccccgcgcgg ccccatttcc actccgacaa gatgaaagaa
120

acgatcatga accaggaaaa actcgccaaa ctgcaggcac aagtgcgcac tggggggaaa
180

ggaactgctc gtagaaagaa gaaggtggtt cacagaacag ccacagcaga cgataaaaaaa
240

ctgcagttct ccttaaagaa gttagggta aacaatatct ctgtattgaa gaggtgaac
299

<210> 385

<211> 291

<212> DNA

<213> Rattus norvegicus

<400> 385

ctgacgttgt ctatagaaca gtggccaacc tttctggatg tgagcaggtg gactccaagg
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ctctggtgaa ctgtctacga ggcaagagcg aggaagagat tatgtctatt aacaaggcct
120

tcaggatcat ctctggcata gtggatggta tcttccttcc cagacatccc aaggagctgt
180

tggcctctgc tgactttcac cccattccca gcattattgg tgtcaacaat gatgagatgatg
240

gctggatcat tccctcgagc atgaccacca ctgactccaa gaagaaaaatg g
291

<210> 386

<211> 304

<212> DNA

<213> Rattus norvegicus

<400> 386

actgagtgga cctgtgaaga atccaaattc caaacaattt tcaacatgga ttcccggtgaa
60

ttccggagaa gagggaaagga gatgggtggat tatatacgatg actatctgga cggcattgag
120

ggacgtccag tgtaccctga cgtggggcct ggctacccctc gggccctgat cccccaccact
180

gccccccagg agccagaaac atatgaggac ataatcagag acattgaaaa gataatcatg
240

ccagggtcac acactggcac agcccctact tcttcgctta cttccccagg ccagctccta
300

ccca
304

<210> 387
<211> 264
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 387

gngcggagga agccgactgt tccggatctc tgcatagcag ggccaaacct ttgctccana
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gatcatggct gccgaggatg tggtggcgac tggngncgac cccagcgagc tggagggcgg
120

cgggctgctt caanagatnt tcacgnccn tctcaacctg ctgctccttg gccatgcata
180

ttcctgctct acaagatcga tcgcngggac cagcccggtg ccaatggga caacnactcc
240

gacgagnnngn ccncgctgnc ncng
264

<210> 388
<211> 267
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 388

cggaacagtc gaggctagat tgacacagct gtccgttcag accccagcac catgcccata
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acactgggtt actgganat ccgtggggct agcgcatgcc atccgcctgc tcctgaaata
120

cacagactcg agctatgagg agaagagata caccatggga gacgctcccg actttgacag
180

aagccagtgg ctgaatgaga agttcaaact gggcctggac ttccccaaatc tgccctactt
240

aattgatgga tcacacaaga cacccag
267

<210> 389
<211> 307
<212> DNA
<213> Rattus norvegicus

<400> 389

gtgccctcac gcagcttaat gtggcctttt cccgggagca ggcccacaag gtctatgtcc
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agcaccttct gaagagagac aggaaacacc tgtgaaagct gatccacgag ggccgtgccc
120

acatctatgt gtgcggggat gctcgaaata tggccaaaga tgtcaaaac acattctatg
180

acattgtggc tgagttcggg cccatggagc acacccaggc tgtggactat gttaagaagc
240

tgatgaccaa gggccgctac tcactagatg tgtggagcta ggagcttacc aacctccac
300

ccctcgg
307

<210> 390
<211> 248
<212> DNA
<213> Rattus norvegicus

<400> 390

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ctactcagtg tccagccctg tggatcctaa caccattgat atgactccca aggagagtgg
120

attagccaaa gtagccccag tgtacaagat ttgcttgta gcccgtgat tgtgctgagg
180

cagtcagccg actcacttct gttcaaaatg gccccatttt tctgattctg ggagacctgc
240

tggagacc
248

<210> 391
<211> 283
<212> DNA

<213> Rattus norvegicus

<400> 391

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tttgtaaaca cattgagggtt cagcatgggc tactccatgg agaaatactg cggccaactt
120

ccagttccac tttcgatgt accgggtgtc agggtaact aacagaccat atgaccttta
180

cagagaggg gaaaaatatg atgcttcac tgtttttga gtttggctc cagcaatatg
240

actttgcatt ctgggatcag ttttacagta aaactctagg aag
283

<210> 392

<211> 290

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 392

ggactatctc cccttaagtg ggaaggcctt agtcaaatgc agtanagagc tataaaacac
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cgagaactct tcatgtgttg tgaaaacttag agggagcagc ttttaacaa gagaactcaa
120

gcaattgctg ccatgccggg gaagccagtc cttcactact tcgatggcag ggggagaatg
180

gagcccatcc ggtggctcct ggctgcagct ggagtagagt ttgaagaaca atttctgaaa
240

actcgggatg acctggccag gctaaggaat gatggagtt tcatgttcca
290

<210> 393

<211> 281

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 393

ttgcactacc ctgcaaggct gtgttgcagg gcccgaaagg ctcactgttc cgaaatggcc
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gagcagtca gacaaggatgt gaagtactac actctggang gagattcaga agcacaaaaga
120

cagcaagagc acctgggtga tcctacatca taagtgtacg atctgaccaa gtttctcgaa
180

gagcatcctg gtgggaaaga agtcctaaga gagcaagctg ggggtgatgc tactgagaac
240

ttgaggacgt ccgggcactc taacggatgc acgagaactg t
281

<210> 394

<211> 287

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 394

ccgctgctta tgccatggc ctggaaactgt acctggatct gctgtcgag ccctgtcgcg
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ctatttatat cttcgccaag aagaacaata tcccnttcca gatgcatact gtggagctgc
120

gcaagggtga gcacctcagc gatgcttgc ccagtgaacc ccatgaagaa ggtaccagcc
180

atgaaggatg gtggcttcac cttgtgtgag agtgtggcca tcctgctcta cctggcgcac
240

aagtataagg ttcctgacca ctggtaaaaa caagactgca ggccccgt
287

<210> 395

<211> 293

<212> DNA

<213> Rattus norvegicus

<400> 395

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actcccagaa ttccaaagtc aaagactctc ataaagcatt atccgatgtg gagattgtgg
120

cccagtca gatacttcatt tttgccggct atgagaccac tagcagtgtc ctttcctttg
180

ttttgtatTT gctggccatt caccctgata tacagaagaa actgcaggat gaaattgatg
240

cagctctccc caataaggca catgccacct atgataccct gctacaaaatg gag
293

<210> 396
<211> 266
<212> DNA
<213> Rattus norvegicus

<400> 396

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60

tgcaggctg gctttgtggg tacagtgtat ccatacatgc ctgaattaac tgaagatctt
120

aactgcagat tctacacatt tctcatcctc taatggcttc ctctggctgc ccagggctga
180

agaaaacttct tcactgtggg gaggttgctg actctggttc tccagggcct cagcagaggg
240

aagttggcca aagcgtgggg tccact
266

<210> 397
<211> 259
<212> DNA
<213> Rattus norvegicus

<400> 397

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cactccggtt cccatggtat ttatgaagga atatgcaatg gggttccaat ggtgtatgatg
120

cccttgggg gtgatcagat ggacaacgcc aagcgcatgg aaactcgggg agctggggtg
180

accctgaatg tcctggaaat gactgccat gattggaaa acgccctaa aactgtcata
240

aataacaaga gttacaagg
259

<210> 398

<211> 252
<212> DNA
<213> Rattus norvegicus

<400> 398

gaaactttaa gaaaagtgc tacttttgc ctttctcagc agaaaaacga gcttgttg
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gagagggcct ggcccgcatg cagttgttc tattcttgc aaccattta cagaacttt
120

acctgaaatc tctggttcac ccaaaggaca ttgatacgat gccagttctg aatggtttg
180

cctctctgcc acccacttac cagctctgct tcattcattc ctgaatagat caggcatttt
240

ggctctactg tg
252

<210> 399
<211> 272
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 399

gngagccaat ggcnctttc attttctgg ggatttggcn ttcttnnttg gttttcnnt
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ttctatngaa tcagcaccat gtcagangga agctcccacc nggtcccact cctctaccaa
120

ttttggcaa tatttgcaa ntgggtgtta aaaatatcag caaatctatg tgcatgcnag
180

cgaaagagta cggcctggn tcaccatgta tctggcattg aagcccactg tggtgctgta
240

tggatatgaa gtattgaaag aagctctgat tg
272

<210> 400
<211> 294
<212> DNA
<213> Rattus norvegicus

<400> 400

catccgtggg ctggctcacg ccattcgct gttcctggag tatacagaca caagctatga
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ggacaagaag tacagcatgg gggatgctcc cgactatgac agaagccagt ggctgagtga
120

gaagttcaaa ctgggcctgg acttccccaa tctgccctac ttaattgatg ggtcacacaaa
180

gatcacccag agcaatgcca tcctgcgcta ccttggccgg aagcacaacc tttgtgggga
240

gacagaggag gagaggattc gtgtggacgt tttggagaac caggctatgg acac
294

<210> 401

<211> 276

<212> DNA

<213> Rattus norvegicus

<400> 401

gctgcgagca ggtctgaccc attgctctct ctgctcagag ttccccaggt ctgaagtctg
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cctgaaagat gtcagccctc aaagctgtct tccagtacat tgacgaaaac caggaccgct
120

tttgtcaagaa acttgcagaa tgggtggcca tccagagcgt gtccgcgtgg ccggagaaga
180

gaggagaagat cagaaggatg acggaagcgg cagtgcagat gtccagaggc tggggggatc
240

tgtggagctg gtggatatcg ggaagcagaa gctccc

276

<210> 402

<211> 271

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 402

ctgacctgac ccatgatgta agggncgta ggggagcatc accactgcaa aggctgacta
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aggncgttn ggctaaaggt cnctttgaag cccagtgtct anagtcacac cttctttgct
120

ctggggccag gaggcctact tcttctttt ctcgnggaat cctggaatct taaagataaa
180

agaacctaga aagaaaatca aaccacttt cttgtgggg cagatggtaa tatggactg
240

agaacagcaa acctgggtc ttggagagga g
271

<210> 403
<211> 253
<212> DNA
<213> Rattus norvegicus

<400> 403

cgcactgctc ctagggcaag agccttcacc tcttctacag ccaacaccat gcgcgagatc
60

gtgcacatcc aggcccccca atgcggcaac cagatcgccg ctaaggcaac aaatatgtac
120

ctcggccat cctagtggac ctggagccag gcaccatgga ctcagtgagg tcggaccat
180

tcggccagat cttcaggcca gacaacttg tgtcgtca gagtggtgca ggaaataact
240

gggcaaaggg cca
253

<210> 404
<211> 312
<212> DNA
<213> Rattus norvegicus

<400> 404

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gggattcaag ccgctggct gcagtctccc ttctctctgc ctgtcagcaa agttatTTT
120

ctttgcaagt cggacgagta agataaaaat acaagatcgc acctccagca gtcacggct
180

ctctggagtt tgagagaata tttcgcgcac agcaaaaactc tttggagtt tattccgtat
240

tcatcatatc gctgtggatg gctggatggt atttcaatca agttttgca acctgtctgg
300

gtctcctgta ca
312

<210> 405
<211> 245
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 405

ctgccggtcg cttcctgagc ctccctctggc tctgtgttca tgccttcaggc ttccacgtcc
60

tgcggccgacn gcgcacatgga gggttaccat aagccagatc agcagaagct ccaggccctg
120

aaggacacag ccaatcgccct gcgcacatcaggc atccanncca ggccaccacc gcggcaggcg
180

nggacacccccc acatcttgnat gtagcgcngn cggagagcng gtcgnncctgn tatnnnnnac
240

caggc
245

<210> 406
<211> 299
<212> DNA
<213> Rattus norvegicus
<400> 406

tcataacccaa gggAACAGCA gtactaacat cacttacatc agtgctgcat gacagtaagg
60

aattccccaa cccAGAGATG tttgacccAG gtcactttct agatgagaat ggaaacttta
120

agaaaaagtga ctacttcatg cctttctcag caggAAAACG gaaatgtgtg ggagagggcc
180

ttGCCAGTAT ggagctgttt ttgttcctga ccaccatTTT acagaatttc aaactgaaat
240

ctctgtctga tccAAAGGAC atcgatataa actcaatacg ttctgagttt tcataatc
299

<210> 407
<211> 290

<212> DNA
<213> Rattus norvegicus
<400> 407

ggaaggggaa gaatgccagt ttttaaaaag gctactaaag gactggcat tagtttagc
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cgtggaaatg tatggagagc cacaagacat ttcacagtca ataccctgag gagtttggc
120

atggggaaac ggaccattga gatcaaagtg caagaggaag cagagtggct agtgatggaa
180

ctgaagaaaa ccaaaggctc accctgtat cccaaattca tcataaggatg tgctccctgc
240

aatgtcatct gtcattat cttccagaat cgtttcgatt ataaagataa
290

<210> 408
<211> 221
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 408

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ttttgnntngc tngggcantg gnaaccnnga agnccnnntgg aganttccan aaaagaaaaaa
120

attttagggc acaaatgtga gaaaaancnt cacaancnntn gggnanannnc cccctgntgc
180

gcctnttgc gggctgcct atgtccaatc cagctatatt g
221

<210> 409
<211> 116
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 409

attttgagat ggaacgattt gaagtcttgg gtgtcccctt cagtcctcaa ctttggac
60

ctgctggtca ggagagggttc aagtgcatacg cttccacaca acatangagn gnnatt
116

<210> 410
<211> 275
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 410

cacagccc accagcncac cctccataac tgcaccaaga ggtatctatcc aacacctccc
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tgagcaggag gagcctgaag actccaaggaa aaagagtcct gaggaaccct ttctgtgca
120

gctggatcta accacaaaacc cacagggta cacactggat gtctccttcc tctacctgga
180

gcctgagaa aagaaactgg tggtcctgcc tttccctggg aaggaacagc gctccctgaa
240

tgccccgggg cccgaaaagc aaagaacccc ctgat
275

<210> 411
<211> 300
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 411

ccctttcaa tatcctacgc ttccctctgt ccatgcttcc catggtncc tcatcgatcc
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tccaggccag tgttctgtg gaccggctgg agaggtattt gggaggagac gattttagaca
120

catctgccat tcgccgcgtc agcaatttg ataaagctgt gaagtttca gaggacttt
180

ttacttgggc ccggacttgg aagccacaat ccaagatgtg aacctggaca taaagccagg
240

ccaatggtgg ctgtggtggg cactgttagct ctggaaatc ctcttggtt tcagccatgt
300

<210> 412
<211> 286

<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 412

cnagaagtta gtggagttact tgaaggcagag ttcgttgcgt ctgtgtttct ggatccttt
60

gatgtgtgtg ggctaactgg tgccaaatgtac tttctctccc gtcagtggc ttcagcagg
120

ggatatttttgc tcactatctt gaagaangct cccagtgccc cagtcctcct tcataatgtcc
180

ccagaggtat cttgaaaactc acagatacca tgactttcaa ggaaagagtg tggaaacttct
240

ttcctaataatgg gggagcatgc attctgtccc agtttttcaa aactgc
286

<210> 413
<211> 272
<212> DNA
<213> Rattus norvegicus

<400> 413

agagaaggcct gctgaggaaaa cactggaaag ctttacctca ggcactaagt tgaaggaaaa
60

acgacaatgg ccacaatggt agaactgagc ctttacatgtc agcagtgtga gtttgtccta
120

ggtctgccag tgaataagaa gaccctccc cgaaaagtcc cgagtttatg ttccatgcgc
180

tattcaatag ctttcatcgac acatatctgc aacttcacat tgatagcaca gaattccatc
240

ataaggcatca ccatggtagc catggtcaac aa
272

<210> 414
<211> 103
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 414

agctccgggg gaggtcgccc acatcattca ggntgaaagc tgcagtgttgc gctgtggccc
60

tggtcttcct gacaggttgc caagcttggg agttctggca gca
103

<210> 415
<211> 273
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 415

aacgccctta aaactgtcat caataacaag agttacaagg agaacatcat gcgcctctcc
60

agcattcaca aggaccgtcc tatcgagcct ctggacctgg ctgtgttctg ggtggagtac
120

gtgatgaggc acaaggnggc gccacacctg cgccccgccc cccacgacct cacctggtag
180

cagtaccact cttggacgt gattggctt ctcctggcca tcgtgttgac ggtggcttc
240

attgtctata aaagttgtgc ctatggctgc cgg
273

<210> 416
<211> 106
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 416

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60

tcaggatgaa anctgcagtg gtggctgnag gnncntggct ncctga
106

<210> 417
<211> 294
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 417

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acacaaggc cctagctatg gagtgcgtat tccacagaca cctatggta ccttggatac
120

tgccaaaact cttaaataca tggactttta cctcagaaac ttgtcttcag atatcctgtt
180

aatcttcagt ttttgttgt ttttgtttt nggaggaagg cctctctcta tgtagctatg
240

gctgtcctag aatcaactctg tagatcaggc tggcctcaga ctcatgcctc tgct
294

<210> 418

<211> 262

<212> DNA

<213> Rattus norvegicus

<400> 418

cgaggcttcc aggtagcggt cggtcgcagt ctgtcccagg gtacgaccgg gccttggca
60

cagattcgcg gaccggggc tgcctttta agggaggggg tggagccacg agtggggatc
120

gaaaagctcc agaaaaacttg aggccagagc cccgcaccag ggtgcagcca tgagtgcgga
180

ggtaaggcgtg acagggcaga accaggagca atttctgctc cttgccaagt cggttaagg
240

ggcagcactg gccacactca tc

262

<210> 419

<211> 145

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 419

acacaaagcn atttanantg ccagactata cttggttaa aggaataacct tttcatgnct
60

ctgggattca aaagncaatt tnccaaaatg tnnggnaana attttgggn cnancggca
120

nttcatntga ncggcttanc ccagt
145

<210> 420
<211> 271
<212> DNA
<213> Rattus norvegicus

<400> 420

ctccaacctg gtgcgccacc agcggctgca caccggggaa aagccgtatg tctgcagcca
60

gtgtggcaag gccttcatct ggagctctgt gtcatcgaa caccagcgca ttcacacagg
120

cgagaagccc tacaagtgtg aagactgcgg caaggcattc cgaggacggt cgcatatttt
180

cggcactta cggacccaca cggcgagaa gcccttctcc tgtggctcct gtggcaaagc
240

gtttggccag agctctcagc tcattccagca c
271

<210> 421
<211> 282
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 421

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60

ttagatgtgag tgggaagaat gggggagatt cgcaagcttg tcctcatcac tggatgtctg
120

attctgggca aggagagctg ggtcctcgga gatgagaact gtttgcagga gcaggtgagg
180

ctcagggctc aggtgcgccca gctttagagacc cgggtcaaac aacaacgggt ggtgattgca
240

cagctcttgc acgagaagga ggtccagttc ctggatagag ga
282

<210> 422
<211> 222
<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations
<400> 422

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60

gancagagca ttgttccccca caccaccatc aaaggcatcc atgaactctt tgtgccgaa
120

aacaaaattg atcaaatccg agctgagttt gagactctcc catcaactacc aattaccaag
180

ctggatctgc agtgggtgca gattctgagc gaaggctggg cc
222

<210> 423

<211> 275

<212> DNA

<213> Rattus norvegicus

<400> 423

gagaaaggcc accaccttagc taggtgaggt gtgccagcat ggtcctgggg gtctcactgt
60

ccccagccct gggacgctgg ttccgccatg caatcccttt cgctatcttc acgctgttac
120

ttctttatat cagtgtatgg ctcttccatg agtggccctt tgagttgccca gctcaaagaa
180

ctcagcagtc cggcctgtgg gaactcaagc tctcttctcc ttctccagcc ctcacctctc
240

tgcttcctgt cacctcaggt gttttacaag gctga
275

<210> 424

<211> 279

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations
<400> 424

attcctcatt gcatgatgcc ttcaaataaa gggcaacgtg aatacagttt ataaatcaac
60

gagtattttta agccttgttt aaaacatctt tttactccan nnnnnnnnnnn nnnnnnnnnn
120

nncaaactaa atcattgttag ctaacctgta atatacgtag tagttgacct ggaaaagttg
180

taaaaatatn gcttaaccg acacgtaaat atttcagata aacattataat tctttgtata
240

taaaanaaag aaaannangn caatggnnnga atnaactct
279

<210> 425

<211> 288

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 425

gtgttcgcag gttccagca ctcttgcga aggactcttg tccttctcta ccagagcagc
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atangaggga atggctgccg tgtctccacc taccagatgt caggcatcggt tgacgtttga
120

agatgtggct gtgaccttca cagatgacga gtggaagcgt ctggcaccca tgcagagagc
180

actctacaag accgtgatgc tggagaacta tgagagcatc atctctctgg ggcttcccgt
240

tcctcgacct gatgtgattc ttcaagttcaa gagaaggggc gaatcctg
288

<210> 426

<211> 286

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 426

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gggggcaggc ctganggccca ccatcttctg catctgacc tgggtcagcc tgacagctgg
120

ggaccgcgta tacatccacc cctttcatct cctctactac agcaaganca nctgcgccca
180

gctggagaac cccagtgtgg agacgctccc agagccaacc tttgagcctg tgccattca
240

ggccaagacc tccccgtgg atgagaagac cctgcgagat aagtgc
286

<210> 427
<211> 235
<212> DNA
<213> Rattus norvegicus

<400> 427

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agggagccag agggcctcac aacaacagag ggttcagag ctccctggag gaaggctcag
120

ttacaggctc agaggctcggt cacagcttag gtgtcctgaa tgtgtccctc agcgtcagaa
180

ccgtgtcggtt ccctgggttga acatcaaatac atgcccggc aagtgggaca ggaaa
235

<210> 428
<211> 249
<212> DNA
<213> Rattus norvegicus

<400> 428

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aaggacgttc agaactacta tggaaatgtt ctgaagacat ctgcagaccc ccagactaat
120

gcttgtgtca ccccaagccaa gggggtcctt ggttacatcc ggaaaagtct gcagaatgtt
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catgaagaag ttatttccag gtattatggc tgcggctgg tggtgccctt gcatctggaa
240

aactgccgg
249

<210> 429
<211> 233
<212> DNA
<213> Rattus norvegicus

<400> 429

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aaactccatt aggcacagtg acatacatgt gtaattcaaa cgctgcactt gagagactga
120

ggcaggagga gatctatcga aaggttgaga ccaactagct gtaggctagc ctgggctatg
180

ctgttaagac cttgtcacaa agtacaagaa gggagaataa aagaatattt cct
233

<210> 430

<211> 287

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 430

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gtgcacatct atgtttcat atctaccgtt tgggtatgcc tttgtccctg ggttagggact
120

ggctctctgg acaagtagat gtcctgttag cctgcagaca tcacatgact ctcaagaacg
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aatcggttat cctggccct gtcctgtgc atgcacattc ccctcctctg tcccgaggca
240

gaggcaaggg tgtgtgaggc ctatggcag aggccatatt gtgaaga
287

<210> 431

<211> 183

<212> DNA

<213> Rattus norvegicus

<400> 431

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tcatatctatg tgtgggtggat gatagaagtt gaacctgttttattgtatgt tgtaaaaata
120

ttttggggc attaaatggc ctattgaaat gctttctgt tcctataata aaataacctg
180

atg
183

<210> 432
<211> 287
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 432

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gtgcacatct atgtttcat atctaccgt tgggtatgcc tttgtccctg ggttagggact
120

ggctctctgg acaagtagat gtcctgttag cctgcagaca tcacatgact ctcaagaacg
180

aatcggttat cctggtccct gtcctgtgc atgcacattc ccctcctctg tcccgaggca
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gaggcaaggg tgtgtgaggc ctatggcag aggcattatt gtgaaga
287

<210> 433
<211> 283
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 433

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ttggaccttc accagtccng gggnggctgg gactcccaca cctcaagccc gagctatgac
120

ttacattcca ctgctggag aagagaggcg gggcccagag tatcctgccc ttgggagtca
180

aagaccctag gngccaggct ggcacaggga tggggaggct ggnctttat aaatatnata
240

tgcaganna aaganna aaaa naaggcgcc cnccgacaag nna
283

<210> 434
<211> 295

<212> DNA
<213> Rattus norvegicus

<400> 434

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aacgagcgc tttctccaga ttagtccaaat tttgtggatg ctattcatac ctttaccagg
120

gagcacatgg gtctgagtgt gggcatcaaa cagcccattt cccactatga ctttaccc
180

aacgggggtt cttccagcc tggctgccac ttccctggagc tctacaaaca cattgcagag
240

catgggctta aatgccataa cccagaccat caaatgtgcc catgagcggtt ctgtg
295

<210> 435
<211> 133
<212> DNA
<213> Rattus norvegicus

<400> 435

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ggtaaccttg acatcacaga actgcttagt aacgaggtaa aaataataaa ggtacaacca
120

gtgcacatcgca aaa
133

<210> 436
<211> 212
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 436

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tcaccagccg acaggaacgt gcagggagag tctgggtcta gggccaactt gtggatgct
120

cccttggatgtt gggccacacg cttgggtgttc ttgcagcact gtgtacgcang cttctcctgc
180

gactcggacc tgcccatccc ggcacacata gc
212

<210> 437
<211> 291
<212> DNA
<213> Rattus norvegicus

<400> 437

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aatgggggag cagccctttt ggtgttgcaa aatgaagttc caggcttcta aaatgttgcc
120

atgtattgaa aggagctaat gccattgtaa atgttattag tttcacatTT cttgagcagc
180

ctagagtaca gggtaacat ttgttagatct tgtaatgtatg tattgtgctg tgaaagtact
240

gtgtgtgaat agcagtagtg gggcaaaaag caatcttgc attggaatgt a
291

<210> 438
<211> 262
<212> DNA
<213> Rattus norvegicus

<400> 438

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gtccacgttg ggcagcacac aagtgtccgt aactctagct ctatggatc tgaccattt
120

ctggccttt cagcacctgc acAAatgtgg cagacacata tacgcttaag taaaaataat
180

aaaaaaaaac gaatcttaa aacatTTTT aaaagaagtg atggagtgaa ttccTgcctt
240

atggcctgct ggaaatggaa ca
262

<210> 439
<211> 272
<212> DNA

<213> Rattus norvegicus

<400> 439

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attaggaaga gggcataga gagctgtgcc tctatggta gcctctggga ctgaagtttg
120

ccacgactag tggttggaca cctggaggc tggctaccta cctgtcttac tccctgaagg
180

acagggttga atctctgggt tccagtcctt agggagatgg agtactgtct gtcagctgct
240

ggctgtgctt tttgaagagg ccaaattgtt tc
272

<210> 440

<211> 284

<212> DNA

<213> Rattus norvegicus

<400> 440

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agccagagca agtgaggact gagcaaggga agggagaacc gattgccatc ggccatcg
120

ctctggtag ggtgagggtt gggcaagag gactggcct ggcagatctt caagtcattg
180

ggaagatgga gataccactg taggggtgaa cacgggaga cctaggagat cccctcccc
240

cccttctct tggcctccga ttcactcctg tcccggtccc tgac

284

<210> 441

<211> 233

<212> DNA

<213> Rattus norvegicus

<400> 441

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aaactccatt aggcacagtg acatacatgt gtaattcaaa cgctgcactt gagagactga
120

ggcaggagga gatctatcga aaggttgaga ccaactagct gtaggctagc ctgggctatg
180

ctgttaagac cttgtcacaa agtacaagaa gggagaataa aagaatattt cct
233

<210> 442

<211> 273

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 442

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tccattcaga gcaagtgttt gcncatcgcc tgcaggacaa aaaacttccc cctctgctct
120

ccgagatctg ggatgtccac gaatgactgt ttctccgtgt cctcngtggtt ggcaaggcag
180

ctgaagttac nganngcttc nnngaagnng nanannctgg ggagagaaaa nnntncagggg
240

gnccgagaaaa agagacnctt nttnnngnaan aag

273

<210> 443

<211> 264

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 443

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tctactaacc ttgtgagatg gagcaactac tagatccttg gacttcccac tcatactgtga
120

tcattgttag ggggttggac tacagactgt aaatcatcat aacaaactcc cttactgtat
180

agaggctatc cataagttct gtgactctag agaacccctga ctactacaga ccctgtttca
240

aaaaagaagc aaaagttgc tggg
264

<210> 444
<211> 283
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 444

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cactacagga ggaattgttc catctgagag accaagcatg cattatactc gctgtctgct
120

gcttctcctg gctggactct tggaactctc tcacagtcag ccagaccaag aagagcctga
180

caataacaacc aaccaaacct acagttgttc tcacagcaga acatctccag ctaccagatt
240

gcctctggna atgccaactt tgccttcgc ctctaccacc tga
283

<210> 445
<211> 290
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 445

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aatatcacaa tctcataagg natggggaat acagacnagg tacnntttca ggcacattca
120

gtgtaaatat atgttagtcat ttatactgnn atattaaata atattatatt tgtgaagaca
180

gagatttatg tcttacaatg taaatganaa acagacaaac ctaatcagat atctggctgg
240

tgaagccatt ggtcagtgtt aggaatttcc agtcaggaga agaccctcta
290

<210> 446
<211> 165

<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 446

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60

aaaccgagaa agganataac atttgaaatg taaatgaaaa atatccaatt aaaaaaaaaa
120

aancaaaccc tgcccagant tttgcncngng ngacaaaaan agaga
165

<210> 447
<211> 173
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 447

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aggaacgtgt gcggactgca gtcctccca agaccataga ggagtgttag gtgattctga
120

tggtgggact tcctggatct ggaaagaccc agtgggcact gaaatatgca aaa
173

<210> 448
<211> 189
<212> DNA
<213> Rattus norvegicus

<400> 448

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cctcagagct ggcgtgcgga aggagaagaa gctcaaggaa cattctaacc cagttaccag
120

aactcagata gaagactaag gtgctgtgt acgtcctgag tattagcact gtaataaaac
180

tgtcacatg
189

<210> 449
<211> 165
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 449

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60

caaaaaacta nnncngatgtn ccattcaan gtggccttct gtacatcana ggnagattct
120

ggctttctac ggcaccagaa gntgtttcac tggcnanaan aaant
165

<210> 450
<211> 184
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 450

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aacaaagaat tactgattca gctacgcagc agaacatatg tgctctactc ttcaagatt
120

aataatcttg cttagtgcata tattgtatat ttaatcttag tctgttgcnng gggagggtct
180

atgc
184

<210> 451
<211> 271
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 451

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60

ttctgtgcgtg aggccctggcc cacgtcacaa gcatttcctt ccagaccac aacctccagg
120

gactgggaca aactggggca ggatgatttg ccacttgctt ggcccgctga tcccagcccg
180

ataacctctcc tctctactct cccaggagac tctcaggccc agtgtgaccc tggggcttgg
240

ctgagaagct gaccaggccc cagggccagc a
271

<210> 452
<211> 103
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 452

caaggagaag cagataaaga agcaaacggc tnctcgctga gctggtaaaa cancaagccc
60

aaggccccaca gaagattcag ctgaagacgg tgatgggtga tct
103

<210> 453
<211> 284
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 453

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tctgtccccca aaatgcctgt ggacttcaac gggtaactgga agatgctgag caacgagaat
120

ttcgaggagt acctgcgtgc gctcgatgtc aacgtggcct tgcgaaaaat cgccaacttg
180

ctgaagccgg acaaagagat cgtgcaggat ggcgaccaca tgcgtatccg cacgctgagc
240

acttttcgaa actatatcat ggacttccaa gttgggaagg agtt
284

<210> 454
<211> 277
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 454

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caagaataca acagcttagtg aaccgttagca gcatgcgaag aggggctgta actatcacca
120

tacatgcact gtcccggtgaa ggtgtgacac gggagacgtg tggatcatgt gatcattgtg
180

aacacccctgt gagctttaaa ataaagtcca ccctgtggtg tcaaaaaana aaaaananan
240

nannaggagn nannannncn ggattangga ccncccc
277

<210> 455
<211> 155
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 455

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nggccatgta gctgccagga ctgctctgcc gtctgcngtc ccaaacccca tccccaccaa
120

tccctgacac actaataaaAG gctttgtgac ctcaa
155

<210> 456
<211> 277
<212> DNA
<213> Rattus norvegicus

<400> 456

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gggggtggtgtt ggcgggtgcc atggaagtgg taatgcattgt gttgatgcag ggattatgca
120

agctgaaact tgttctcagg ggccatgtca gatgtgtgag aatacctgga ctctggttt
180

tcctccatag taaagggtg ttctccact ctctacaagt ctcttcatgc cagagggttt
240

tcaagactcc cattagtgg ccaggaggat ttcattg
277

<210> 457
<211> 277
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 457

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cgtgtgtgtta agtgtgggtg tgtgtgcgtg ctctgctcat ctctaggaa ctgcgagggtg
120

ggaagtggga ggtgggaggt ggagggaccc agtagtgaga agaactagga ggtgaggcct
180

aatggccgc agattggtca tgtttggtg ctgatgacag aggggccagt cccaggggag
240

gaggcttngc gggcnactt tnttgtctcc tgcna
277

<210> 458
<211> 233
<212> DNA
<213> Rattus norvegicus

<400> 458

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caaatatata ttcaatgtcta aaaaaacaaa atcctgtgtt cagtttagaa tggtttgatg
120

tagctgagaa gctttgcccc acaacaataa ctgaagctac tgcgttcat aaagttcaca
180

tggctttata gccttgcaa aacatatcta taaatcaatt acttttgaa aat
233

<210> 459
<211> 294
<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations
<400> 459

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gtcacccgta atccaccgccc ctggccgagg aaggcatagc tgctggaggt gtaatggacg
120

tcaacactgc tctacaagag gtgctgaaga ccgcgcctcat ccacgatggc ctagcacgtg
180

gcatacgcga agtgccaaag ccttagacaa gcgcacaagcc catctctgcg tgcttgcac
240

caatgtgatg agcccatgta tgtcaagctg gtgnnggcct ttttnccgaa caaa
294

<210> 460

<211> 300

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations
<400> 460

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60

gagaaccaac catggcagc tttactaagg aagagttgac tgccatatcc tcgatgaagg
120

nttcactgct aaggacattc tggaccaaaa aatcaatgaa gttctccctt gatgataagg
180

atgctttcta tggcgccgac ctggagacg ttctaaagaa gcatctgagg tggctgaaag
240

tcttccccgt gtactccctt ctagctgtca gtgtatgaca gcgagccata gtgagcacct
300

<210> 461

<211> 121

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations
<400> 461

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60

atgtccgtca gggtgacnca gaaatcctan aagangtcca cctcnggtcc ccgggacttc
120

a
121

<210> 462
<211> 133
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 462

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60

gaccctata actccnnnag gctgtcctca gcttgngnac agcctnagcc actccaaant
120

tngatcaaac gtt
133

<210> 463
<211> 281
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 463

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ctccgggtgtc ccaaactaga ggtgagcatg gcagaacacagg aacccactgc tgagcagctc
120

gctcagatag ctggagagaa tgaggaagac gagcaactctg tgaactacaa gcctccagcc
180

cagaagagca tccaggagat ccaggaactg gacaaggatg atgaaaggct tcgaaagtac
240

aaggngggccc tgctggcccg agtagctgtc tctgcagacc c
281

<210> 464
<211> 264

<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 464

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tgcctancaa tgaccaccca gcagantgtt ctccagggcc cgggaccncng gggtttccga
120

ntcgtggcg gcaaggactt tgagcaacct ctcgccattt cccgggtcac tcccgggagc
180

aaggntgnta tagctaactt atgcatacga gattnatca cagccattga tgggnagat
240

accancagta tgacaaaatnn gaag
264

<210> 465
<211> 277
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 465

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tgtccacgaa atccttgca acnctcagct tggagggtga tcattctaca cccccaagtg
120

ccnatgggtc ggtcaaaccc tacaccaact tcgacgntga gagggatgct ttgaacattg
180

aacagcaat caagaccaaa ggcgtggacg aggtcaccat tgtcaacatt ctgactaacc
240

gcagcaatgc acagaggcag gacattgcct tcgccta
277

<210> 466
<211> 249
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 466

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ctcacccgtga ccaagttct ctgagtgtcc agccaaccca ggctcaccag ctccctcnag
120

ctaccgcncg tccatcaggta caactgccaa ccccaggctg aanaccaaac ccagctatga
180

gctcctggag gcatgactcc ctcagggcca gcagctccga tccctccag tagtcatcat
240

gggnaggg

249

<210> 467

<211> 253

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 467

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tcctgcgagt actccaacac caacatcgat gggcggcgga aaatagcctt cgctatcact
120

gccattaagg ttctggccaa cggtagac aacaagctgc gtgaggacct ggagcggctg
180

aagaaaatcc gagcccatag agggctgcgc cactttggg gccttcgtgt ccgggtcag
240

cacaccaaga cat

253

<210> 468

<211> 301

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 468

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cttccccgtg ttactccctt ctatgctgtc aagtgtatg acagcagagc catagtgagc
120

accctggctg ccattggac aggatttgcat tgtgcaagca agactgaaat acagttggtg
180

caggggcttg ggggcctcc agagaggatt atctatgcaa atccttgtaa gcnagtgtct
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cagatcaagt atgctgccag taatggagtc cagatgatga ctttgacag taaaatttag
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t
301

<210> 469
<211> 136
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<213> Rattus norvegicus

<223> unsure at all n locations
<400> 469

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120

gcagccatga ccgagc
136

<210> 470
<211> 147
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
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120

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147

<210> 471
<211> 294
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
<400> 471

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ggctgtncgc agctgcaccc gnccgtcctg tctgccgtgg gcttcactgg gtcaggcatt
120

ggcagctgca tcccatacg ggncaagatg atgtctgctg cagcagttgc caacggggc
180

ggagtcgnccn caggaaggcct tggttagccan actacagtcc antangtgta tttggnnntn
240

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294

<210> 472
<211> 300
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<213> Rattus norvegicus

<223> unsure at all n locations
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ccactccggg cttccttagga aggtagctct ggagtgagaa gggcttgcc tccaggctt
120

ctgcctcctc gacccaatcc tcccgtgac ccaacatcg cggtcgcaac cctcgccgcc
180

tctggaaac tttgcccatt gcaacggca gacacttctc actggaaactt acaatctgct
240

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<213> Rattus norvegicus

<400> 473

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120

gaaatatattgc ctggaggaga catggctgag atcggagaga agggataaaa tctcagtggt
180

ggtcagaagc agcgagtcag cctggccaga gctgcctatc aagatgctga catctatatt
240

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<210> 474

<211> 155

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 474

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<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 475

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120

gtgggaacgg tgacacttac tatctgtatg atgnccatga acatgttcac cggcaacaac
180

aagatctgtg gttggaatta tgagtgccta nnatttgaag angacgtgct gancagcgac
240

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282

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<213> Rattus norvegicus

<223> unsure at all n locations
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120

cttgagtga tccagccctcg atcaaaagaa ttgtcccgag tccccttcc cccaaagaga
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<213> Rattus norvegicus

<223> unsure at all n locations
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120

gctctccaca tgtcccagac ctnactctga ttgaccttcc tggtatcaca agagtggctg
180

tgggtgacca gcctgcagac atcgaacaca agatcaagan acttatcact gaatacatcc
240

agaaaacagga gaccatcaac ctggtggtgg tccccagcaa tgtggcattg ccacca
296

<210> 478
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<223> unsure at all n locations
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cagttcacct ctgtgggctg cggagcacct ctgccgcagc ccagacatct tccctgagca
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gaggcagaac aagcataggc gctttcagaa taccctagcc gtcctccgga agtctggtt
180

gntggaaatc actctgaaag ccaaggagtt gattcgtag aaccaagcaa ctnaggtgna
240

actggaccag ctgaaggagc aaaccagatg ttnatagagg ccaccaagac aggg
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<213> Rattus norvegicus

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atgtgcattgg gcaatttcat gacctcatgg aactcttag aattggtggt aaatcacaga
120

tacaaattac ttgttatgg gagactatgt ggacagagga tattactcag ttgaaacagt
180

tacactgctt gtagctctta aggttcgtt ccgagagcgt atcaccatac tccganggaa
240

tcacgagagc agacagatca cacaagttt tggttctac g
281

<210> 480

<211> 293

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<213> Rattus norvegicus

<223> unsure at all n locations

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aacccaggag ctttctctct gnggaagggg tgganatagc tgtttaaaga cactgcaacc
120

agaaaagccaa gcattctgtc actaaggcagg anactgagtg cccacttgga agaagaaata
180

aaagatggtt cttagcacag aggaaaacag gagtgttgat ttagtcaact tacccagtgt
240

cccactgccc gatggagagg ctggcgtagg ggagaacaac gggattcctt gna
293

<210> 481
<211> 298
<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
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agaaaaggccc ccgcacccgt caggggtctg gtgcagagtc tgaagnccctg tatgactttg
120

tttttattgt ggctggtgag aaataggatg gtgaagagat ggagattggg gaagtagctt
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gcgggaactc tggatngatc aatncccagc tngtttgggg gttccnagcc anaagaggca
240

nncccagnnng attcgnnaat ttgnncacnc ctggagctgt cnacaattcc tcttccnc
298

<210> 482
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<213> Rattus norvegicus

<223> unsure at all n locations
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60

agttna
65

<210> 483
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<212> DNA
<213> Rattus norvegicus

<223> unsure at all n locations
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ccctcacctt cttaagaga agaaagtggc cattaggcctt tggttctggc gtgggactgg
120

ggatggccta ctccaactgt cagcatgact ttcaggctcc atatcttcta catggaaaat
180

atgtcaaaga gcagtgactt atgctangaa catcccagcg ggagaaaaga gaaggctcg
240

ttattcctca ggaatactga agtgccctgg
270

<210> 484
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<223> unsure at all n locations
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120

gcagtgctag cgtcatctgg ggatcttgag aacgatgagc aggccagccag cgccatctna
180

gagctggtca gcacagcctg tggcttcgg ctgcaccatg gcacgaacat cccttcaag
240

cgcctgtctg tggctttgg tgaacacacg ctgctgg
277

<210> 485
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<223> unsure at all n locations
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tccgagtat caacgagcct acagctgcag ctctggctta cggctctggac aaatccgaag
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acaaagtcat tgctgtatat gatttaggtg gaggaacctt tgacatttct atcctggaaa
180

ttcagaaagg agtgtttnan gtgaaatcca ccaatgggga cactttctta ggaggtgaag
240

actttgacca agctttgtta cggcacattg tcaaggagt
279

<210> 486

<211> 204

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

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gggctgcggg anggtccgga cccggcggtcc gattgcagcg ccattccagtt tgcatgaaac
120

tttcacctgc gtcggggga acagtttctg ctccgactcc tgatcggtca cctccctgtt
180

ttcccgacag cggggactgt cttt

204

<210> 487

<211> 290

<212> DNA

<213> Rattus norvegicus

<223> unsure at all n locations

<400> 487

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cggccgtgcc acccaccagc aaccatgagc gcggccggcc ccgggtgttagt ctgctgtcct
120

ctagattagt gctctcctcc gcgacggtcc gcagcatgga gtcggccggcc gccagccccgc
180

cggccagctt gcctcagacc aaaggaaaaat ccaaaaggaa aagggattta cgaatatcct
240

gtgtgtccaa gccacccgtg tccaacccca caccgggg aaactggact
290

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<213> Rattus norvegicus

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cgtctgtgtc caggtcggtc tggctgtcca tcagctctcg tcatngggag agtcagcttc
120

ccggagggtt tgggtgatgg ggcgttggca ggtngctgtt ggggaa
166

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<400> 489

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gaatttggaaat ggatttaaaa ctatccaacc acgtttttaa tgctttaaaa caacatgcct
120

actcggaaga acgtcgaagt gcccgtctcc atgagaagaa ggaacattcc accgctgaaa
180

aaggcagttga tcctaagaca cgcttactta tgtataaaat ggtcaactct ggaatgttgg
240

agacaatcac tggctgtatt ag
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SO-3170

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<400> 564

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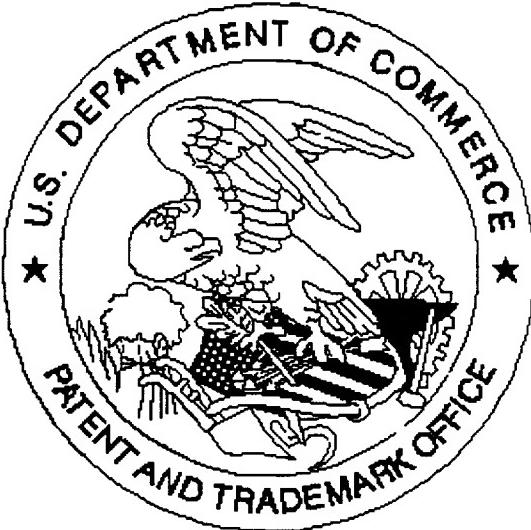
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